

The  $v_1$  and  $v_3$  bands of  $H_2^{17}O$  and  $H_2^{18}O$ : line positions  
and strengths

Robert A. Toth  
California Institute of Technology  
Jet Propulsion Laboratory  
Pasadena California 91109

Tables 8

## ABSTRACT

High-resolution spectra of  $\text{H}_2^{17}\text{O}$  and  $\text{H}_2^{18}\text{O}$  were recorded with a Fourier-transform spectrometer covering transitions in the (100)-(000) and (001.)-(000) bands. The measured line frequencies were used to determine high accuracy values of rotational energy levels in the (100) and (001.) vibrational states for the two isotopic species. Measurements of the line strengths were fitted to a model in which 19 transition moment parameters were determined for B-type bands and 8 parameters for the A-type bands for each molecule. The fitting technique did not consider interactions between the (020), (100), and (001) vibrational states. The experimental results provide a more accurate representation of the line positions and strengths than those presently available for these bands.

## I. INTRODUCTION

This is the final of three papers involving high resolution measurements and analysis of the three interacting vibrational states: (020), (100), and (003.) of H<sub>2</sub>O. The first paper(1) covered observations of the (020)-(010) and (020)-(000) bands of H<sub>2</sub><sup>16</sup>O, H<sub>2</sub><sup>17</sup>O, and H<sub>2</sub><sup>18</sup>O. The second report(2) presented further measurements in the (100)-(010), (001)-(010), (100)-(000), and (001)-(000) bands of H<sub>2</sub><sup>16</sup>O. The present study includes high accuracy data of line positions and strengths of vibration-rotation transitions in the (100)-(000) and (001)-(000) bands of H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O .

Several reports(3-13) have been published which include measurements and/or calculations of line positions and strengths in the v<sub>1</sub> and v<sub>3</sub> bands for one or both of the isotopic species noted above. The extensive listing of computed values given by Flaud et al.<sup>12</sup> covering H<sub>2</sub><sup>16</sup>O, H<sub>2</sub><sup>17</sup>O, and H<sub>2</sub><sup>18</sup>O transitions between 0 and 4350 cm-' was based upon measurements made before 1981. The values given in that compilation for the (020)-(000), (100)-(000), and (001)-(000) bands of H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O were taken from reports by Camy-Peyret et al.(9) (H<sub>2</sub><sup>17</sup>O) and Flaud et al.(10) (H<sub>2</sub><sup>18</sup>O) which, further, were derived from an analysis of unreported measurements, obtained, for the most part, with a grating spectrometer with a spectral resolution of 0.03-0.05 cm-' . These same values(9,10) of computed line positions and strengths were incorporated in the 1986 edition of the HITRAN database(13) and these same values are in the present compilation . The results obtained in the present study provide

a more accurate representation of line positions and strengths for the bands and isotopic species noted above than those given in Refs. (12,13).

The present study (as well as the previous reports(1,2)) does not include a perturbation treatment of the data. Instead, the experimental line strengths for each band of each molecule were analyzed using a one band fit. and the computed results represent unperturbed values.

### II. EXPERIMENT

The experimental details are the same as those discussed in the first report(1) on the  $2v_2$  bands of  $H_2^{17}O$  and  $H_2^{18}O$ . The experimental conditions and extent of the measurements used in the present study are given in Table 1. The table lists the spectral range, unapodized spectral resolution, absorption path lengths, total sample pressures and percent abundances of each isotopic species (including  $H_2^{16}O$ ) for each run. The lower portion of the table lists the frequency range and number of lines measured for each band alnd molecule. The first two runs given at the top of the table were observations of normal samples of water vapor contained in a 6-m base length multiple transversal absorption cell, whereas the remainder of the runs were obtained with oxygen-enriched  $H_2O$  samples contained in a 2.39 m long absorption cell. The  $H_2^{17}O$  and  $H_2^{18}O$  samples were purchased from Merck and Company Inc. ; the stated isotopic purities were 98.1%  $H_2^{18}O$  for one sample and 60.4%  $H_2^{17}O$  for the other. Due to slight contamination from various  $H_2O$  samples

used prior to a given run of o-enriched H<sub>2</sub>O, the values of the isotopic abundances were not always the same as the stated values as shown for several of the runs listed in the table. The method used to determine the correct relative amounts in the samples was described in my earlier report. Also in that report is a description of the method used to transfer the evaporated gas from the glass tubes (containing the H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O liquid samples) to the absorption cell.

The spectra were obtained with a Fourier transform spectrometer (FTS) located at the McMath solar telescope facility at the Kitt Peak National Observatory. All data were obtained with the sample temperatures near or at room temperature (296K) with sample temperatures inferred from readings of one or more thermistor probes in thermal contact with the absorption cell walls. Total sample pressures were measured with a Baratron gauge. The IR source was a 1000W iodine lamp enclosed in a quartz envelope and the radiation traveled through short open spaces and the absorption cell before entering the vacuum tank which enclosed the FTS . The IR detector was an InSb element cooled by liquid-N<sub>2</sub>. Each spectral run consisted of 8 co-added interferograms obtained over a time span of approximately 50 min. The composite interferograms were transformed into spectra at the Kitt Peak facility.

### III. SPECTRAL ANALYSIS AND ENERGY LEVELS

The line centers were measured with two computer programs.

One labeled LINEFINDER, determines line center positions and relative absorption peaks and the other uses the technique of nonlinear least-squares (NLLS) in which absorption line positions, strengths, line widths and continuum parameters are fitted simultaneously in an interactive mode. The latter technique was used to determine experimental values of line strengths and the majority of line center values. These computer algorithms have been used in several of my previous studies (1,2,15-17). The measured line positions obtained by both techniques were calibrated and corrected to  $H_2^{16}O$ ,  $H_2^{17}O$ , and  $H_2^{18}O$  frequencies and these standards were used in the previous studies(1,2) .

The rotational energy levels in the (100) and (001) vibrational states of both isotopic species were derived by the addition to each measured transition frequency of the (100)-(000) and (001)-(000) bands the appropriate lower state level given in Ref. 15 for  $H_2^{17}O$  and  $H_2^{18}O$ . These results were weighted and then averaged for each, level. Table 2 lists values of the rotational energy levels obtained by this method for the (100) and (001) states of  $^{13}H_2^{17}O$ , and Table 3 is a comparable listing for  $H_2^{18}O$ . Included in the tables are estimations of the uncertainties in the values.

#### IV. LINE STRENGTHS

The strength,  $S$ , of a  $H_2O$  transition at frequency  $\nu$  may be expressed to good approximation by

$$S = C(v/Q)(g/T)[1 - \exp(-v/kT)] \exp(-E(L)/kT) |R(L,U)|^2$$

where  $C = 8\pi^3/3hc$

$$Q = Q_v \times Q_R$$

$$\text{and } E(L) = E_v(L) + E_R(L), \quad (1)$$

where  $Q$  is the partition function which can be expressed as the product of the vibrational,  $Q_v$ , and rotational,  $Q_R$ , partition functions,  $g$  is the degeneracy due to the nuclear spin of the lower state level,  $k$  is the Boltzmann constant,  $T$  is the temperature,  $E(L)$  is the lower state energy equal to the sum of the lower state vibrational energy,  $E_v(L)$ , and rotational energy,  $E_R(L)$ , and  $R(L,U)$  is the vibration-rotation dipole moment matrix element connecting the lower state,  $L$ , with the upper state,  $U$ . When  $T = 296K$ ,  $Q_R = 175.5$  and  $176.1$  for  $H_2^{17}O$  and  $H_2^{18}O$ , respectively, and  $Q_v = 1.0004$  for both species and for temperatures within  $30^\circ K$  of  $300K$ ,  $|Q(T) = Q(296K)[296/T]^{3/2}$ .

Without considering near resonance effects, the vibration-rotation dipole moment element,  $R(L,U)$ , given in eq.(1), can be expressed as,

$$R(L,U) = \sum_j u(j)x(j)$$
$$x(j) = \langle v'', J'', K_a'', K_c'' | A(j) | v', J', K_a', K_c' \rangle, \quad (2)$$

where  $u(j)$  are the dipole moment coefficients,  $A(j)$  are the transformed transition moment operators, and prime and double prime denote upper and lower states, respectively.  $x(1)$  is the matrix element of the direction cosines in which  $A(1)=\Phi_\alpha$  with  $\alpha=z$  for  $A-$

type transitions and  $\alpha=x$  for B-type transitions. The asymmetric top wave functions,  $AS(V, J, K_a, K_c)$ , are expressed as an expansion of the symmetry-adapted wave functions,  $s(J, K, \gamma)$ , as

$$AS(V, J, K_a, K_c) = \Psi_V C(J, K_a, K_c | J, K, \gamma) s(J, K, \gamma), \quad (3)$$

where the  $C$ 's are coefficients of the wave functions, thus expressing the lower and upper state wave functions in terms of symmetry-adapted rotational wave functions.

In terms of the F-factor formalism, eq. (1) becomes,

$$S = (v/v_o) S_v x(1)^2 g[1 - \exp(-v/kT)] \exp(-E_R(L)/kT) F/Q_R$$

where  $S_v = 8\pi^3 |u(1)|^2 v_o \exp(-E_V(L)/kT) / (3\hbar c k T Q_V)$ . \quad (4)

$F$  is the F-factor,  $v_o$  is the band center frequency and  $S_v$  is the vibrational band strength. The coefficients of the F-factor,  $a(j)$ , are related to the coefficients,  $u(j)$ , of the dipole moment matrix elements,  $x(j)$ , by the following. Expressing  $F$  by,

$$F = f^2$$

$$f = 1 + \sum_{j>1} a(j) y(j)$$

then the  $a(j)$ 's and  $u(j)$ 's are related by

$$a(j) = u(j)/u(1) \quad j>1$$

$$y(j) = x(j)/x(1) \quad j>1. \quad (5)$$

The matrix elements involved in  $R(L, U)$  and used in this study

are presented in tables in my recent reports (1,2). The matrix elements involved in the B-type transitions contain 19 terms in which the elements  $j=2$  to 8 are those given by Flaud and Camy-Peyret(18) and the following 11 terms ( $j=9$  to 19) were empirically derived and found to be necessary in the  $H_2^{16}O$  analysis of the (010)-(000) band. The parameters used in the A-type transitions of the (001)-(000) bands contain the same 8 elements as those derived by Flaud and Camy-Peyret(18).

The measured line strengths were least-squares fitted by using the expressions given in Eqs. (1)-(3) and outlined in Refs. 1,2. The matrix elements of the direction cosines were computed from the vibration-rotation parameters given in literature: (000) states of  $H_2^{17}O$  and  $H_2^{18}O$  from Ref. 15, and the (1.00) and (001) states of  $H_2^{17}O$  and  $H_2^{18}O$  from Ref. 9. It should be noted that the measured line strengths were normalized to 100% of the isotopic sample, and these normalized values were used in the analyses. Values and associated estimated uncertainties of the matrix elements of the expanded dipole moment derived from the fits are given in Table 4. The lower portions for the entries for each band and isotopic species lists the number of lines fitted and the values of the standard deviation in percent,  $\sigma\%$ , of the line strength fits.  $u\%$  is defined by

$$0\% = 100 \{ \sum [S_{obs} - S_{cal}]^2 / S_{h1}^2 \} / W\%, \quad (6)$$

where N is the number of lines included in the fit. Measured line

strengths of transitions strongly affected by resonance effects were not included in the analyses. Included in Table 4 are values of matrix elements derived in other studies: the (100)-(000) and (001)-(000) bands of  $H_2^{17}O$  by Camy-Peyret et al. (10) and the (1.00)-(000) and (001)-(000) bands of  $H_2^{18}O$  by Flaud et al. (11). Those studies (10,11) took into account the interactions between the three vibrational states (020), (100), and (001) and comparing those results to the present values involves uncoupling the Fermi-type interaction between the (020) and (100) states. The method used in the first two papers (1,2) and used here was to apply the following expressions:

$$\begin{aligned}
 C_{32} &= h_{32}/(E_3 - E_2) \\
 C_{23} &= h_{32}/(E_2 - E_3) \\
 C_{12} = C_{33} &= 1/\sqrt{1 - C_{23}^2} \\
 \mu_2^o(j) &= C_{22}\mu_2(j) + C_{23}\mu_3(j) \\
 \mu_3^o(j) &= C_{33}\mu_3(j) + C_{32}\mu_2(j),
 \end{aligned} \tag{7}$$

where  $h_{32}$  is the first order coupling constants between the (100) state (labeled 3) and (020) state (labeled 2).  $E_3$  and  $E_2$  are the observed rotationless energy levels for the (100) and (020) vibrational states and  $\mu_n(j)$  are the matrix elements obtained in the other studies (10,11).  $\mu_n^o(j)$  are the uncoupled constants representing the other studies and the computed values are included in Table 4. The computed values of  $\mu_n^o(j)$  were derived from Eq. (7) using the coupling constants,  $h_{32}$ , given in Ref. 9 for  $H_2^{17}O$  and  $H_2^{18}O$ .

and the matrix elements,  $\mu_n(j)$ , given in Refs. 10,11. These computed values represent a first approximation to the uncoupled constants. Higher order terms,  $h_{32}'$  etc., and more involved expressions than those given in Eq. (7) are involved in obtaining a higher order approximation of  $\mu_n^0(j)$ ; however, the first order results given in Table 4 are good approximations.

## V. RESULTS

Table 5 lists lines of the transitions observed in the (100)-(000) bands of  $H_2^{17}O$ . Entries for the table include the observed line position, the observed minus the computed line position (o-c), rotational quantum assignments, the observed strength, the estimated uncertainty in the measured strength (%s), the observed minus the computed line strength in percent [(o-c)%], the ratio R of the observed line strength to that given for  $H_2^{17}O$  in the tabulation by Flaud et al.(12) (and in the 1986 edition of the HITRAN database). If the magnitude of (o-c)% is about 14% or greater, the computed line strength value is given instead of the percent difference. The majority of these entries are of transitions which are moderately to strongly perturbed. The values for the line strengths are normalized to 100% of the isotopic species in units of inverse square centimeters per atmosphere (1 atm=760 Torr) whereas the values given in Refs.12,13 are given in  $cm^{-1}/(mol\ cm^2)$  and reduced by the normal isotopic abundances ( $3.7 \times 10^{-4}$  for  $H_2^{17}O$ ). Therefore values from Refs. 12,13 were converted to inverse centimeters squared per atmosphere by applying the factor

$2.48 \times 10^{19}$  (at 296K) and dividing the result by the proper isotopic abundance in natural water to determine the values of R given in Table 5. The experimental line strengths are presented in the table for a temperature of 296K whereas the sample temperatures of several of the spectra from which the strengths were determined were slightly different than 296K. These values were converted to those for T=296K with the use of the equations given in Eq. (1) and the ground state rotational levels given in Ref. 15.

The observed positions are given to three, four, or five decimal places in Table 5 which indicates the accuracy of these

transitions were not included and, in addition, entries with %s=15% were not included because these transitions resulted in averaged values with uncertainties of as much as 60% to possibly less than 10%. This range of uncertainty for each of these transitions arises from one or more of the following reasons: (a) blending (b) weakness of transition intensity and (c) poor agreement between values derived from the various spectra.

Table 6 is a listing comparable in content to that of Table 5. This table lists the measurements and computations for the (100)-(000) band of H<sub>2</sub><sup>18</sup>O. Tables 7 and 8 are the listings for the (001)-(000) bands of H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O, respectively. A few of the transitions given in Tables 5-8 do not have entries for R which means that those transitions were not included in the previous calculations(12 ,13) . This is because refs. (12,13) used an intensity cut-off criterion which includes the isotopic abundance.

#### VI . ACKNOWLEDGEMENTS

The author wishes to thank the Kitt Peak National Observatory for the use of the FTS and J. Wagner for assistance in obtaining the H<sub>2</sub>O spectra. The author also wishes to thank O. Raper for his kind assistance in the preparation of the manuscript. The Atmospheric Trace Molecule Spectroscopy (ATMOS) dedicated Computer Facility was used in the analysis of the experimental data. The research described in this paper was performed at the Jet Propulsion Laboratory, California Institute of Technology, under contract with The National Aeronautics and Space Administration.

### References

1. R. A. Toth, "The  $2\nu_2-\nu_2$  and  $2\nu_2$  bands of  $\text{H}_2^{16}\text{O}$ ,  $\text{H}_2^{17}\text{O}$ , and  $\text{H}_2^{18}\text{O}$ : line positions and strengths," J. Opt. Soc. Am. B 10, 1526-1544 (1993).
2. R. A. Toth, "The  $\nu_1-\nu_2$ ,  $\nu_3-\nu_2$ ,  $\nu_1$ , and  $\nu_3$  bands of  $\text{H}_2^{16}\text{O}$ : line positions and strengths," J. Opt. Soc. Am. B 10, 2006-2029 (1993) .
3. D. M. Gates, R. F. Calfee, D. W. Hansen, and W. S. Benedict, "Line parameters and computed spectra for water vapor bands at  $2.7\mu$ ," U. S. Dept. of Commerce, National Bureau of Standards Monograph 71 Aug. 3, (1964).
4. P. E Fraley, K. Narahari Rae, and L. H. Jones, "High resolution infrared spectra of water vapor  $\nu_1$  and  $\nu_3$  bands of  $\text{H}_2^{18}\text{O}$ ," J. Mol. Spectrosc. 29, 312-347 (1969).
5. L. A. Pugh and K. Narahari Rae, "Spectrum of water vapor in the 1.9 and  $2.7\mu$  regions," J. Mol. Spectrosc. 47, 403-408 (1973).
6. L. A. Pugh, Ph.D. dissertation, "A detailed study of the near infrared spectrum of water vapor", The Ohio State University, 1972; Microfilm #72-21,005, University Microfilms, Ann Arbor Michigan..
7. C. Camy-Peyret, J.-M. Flaud, G. Guelachvili, and C. Amiot, "High resolution Fourier transform spectrum of water between 2930 and  $4255 \text{ cm}^{-1}$ ," Mol. Phys. 26, 825-855 (1973).
8. R. A. Toth and J. S. Margolis, "Spectrum of  $\text{H}_2^{18}\text{O}$  in the 2900 to  $3400 \text{ cm}^{-1}$  region," J. Mol. Spectrosc. 57, 236-245 (1975).
9. C. Camy-Peyret, J. -M. Flaud, and R. A. Toth, "The interacting states (020), (100), and (001) of  $\text{H}_2^{17}\text{O}$  and  $\text{H}_2^{18}\text{O}$ ," J. Mol. Spectrosc. 87, 233-241 (1981).

10. c. Camy-Peyret, J.-M. Flaud, and R. A. Toth, "Line positions and intensities for the  $2v_2$ ,  $v_1$ , and  $v_3$  bands of  $H_2^{17}O$ ," Mol. Phys. 42, 595-604 (1981).
11. J.-M. Flaud, C. Camy-Peyret, and R. A. Toth, "Line positions and intensities for the  $2v_2$ ,  $v_1$ , and  $v_3$ , bands of  $H_2^{18}O$ ," Can. J. Phys. 58, 1748-1757 (1980).
12. J.-M. Flaud, C. Camy-Peyret and R. A. Toth, Water vapour line parameters from microwave to medium infrared (an atlas of  $H_2^{16}O$ ,  $H_2^{17}O$  and  $H_2^{18}O$  line positions and intensities between 0 and  $4350\text{ cm}^{-1}$ ) Pergamon Press, London (1981).
13. L. S. Rothman, R. R. Gamache, A. Goldman, L. R. Brown, R. A. Toth, H. M. Pickett, R. L. Poynter, J.-M. Flaud, C. Camy-Peyret, A. Barbe, N. Husson, C. P. Rinsland, and M. A. H. Smith, "The HITRAN database: 1986 edition," Appl. Opt. 26, 4058-4097 (1987).
14. L. S. Rothman, R. R. Gamache, R. H. Tipping C. P. Rinsland, M. A. H. Smith, D. C. Benner, V. M. Devi, J.-M. Flaud, C. Camy-Peyret, A. Perrin, A. Goldman, S. T. Massie, L. R. Brown, and R. A. Toth, "The HITRAN molecular database: editions of 1991 and 1.992," J. Quant. Spectrosc. Rad. Transfer 48, 469-507(1993).
15. R. A. Toth, "Transition frequencies and absolute strengths of  $H_2^{17}O$  and  $H_2^{18}O$  in the 6.2-urn region," Opt. Soc Am. B 9, 462-482 (1992).
16. R. A. Toth, " $v_2$  band of  $H_2^{16}O$ : line strengths and transition frequencies," Opt. Soc. Am. B 8, 2236-2255 (1991).
17. R. A. Toth, "HD $^{16}O$ , HD $^{18}O$ , and HD $^{17}O$  transition frequencies and strengths in the  $v_2$  bands," J. Mol. Spectrosc. (in press).

18. J. -M. Flaud and C. Camy-Peyret, "Vibration-rotation intensities  
in H<sub>2</sub>O-type molecules application to the 2v<sub>2</sub>, v<sub>1</sub>, and v<sub>3</sub>  
bands of H<sub>2</sub><sup>16</sup>O," J. Mol. Spectrosc. 55, 278-310 (1975).

Table 1. Experimental conditions and extent of measurements

spectral range (cm <sup>-1</sup> )	unanoized resolution (cm <sup>-1</sup> )	path length (m)	sample pressure (Torr)	percent abundance of isotopic species
				H <sub>2</sub> <sup>16</sup> O    H <sub>2</sub> <sup>17</sup> O    H <sub>2</sub> <sup>18</sup> O
2622-4457	0.011	193.	3.98	99.6    0.04    0.2
2622-4506	0.011	433.	4.01	99.6    0.04    0.2
2954-4124	0.011	2.39	0.30	25    0.47    73.5
2922-4235	0.011	2.39	1.08	17    0.52    81.3
2890-4254	0.011	2.39	5.30	6    0.58    92.2
2881-4298	0.011	2.39	13.8	4    0.60    94.0
2967-4131	0.011	2.39	0.52	15    52.6    31.7
2948-4196	0.011	2.39	1.07	15    54.1    30.5
2887-4292	0.011	2.39	5.06	14    56.8    28.1
2881-4298	0.011	2.39	13.8	14    57.7    26.6

  

Extent of measurements				
molecule	band	frequency range(cm <sup>-1</sup> )	number of lines	
H <sub>2</sub> <sup>17</sup> O	(100)-(000)	3201.644 - 4126.271		382
H <sub>2</sub> <sup>17</sup> O	(001)-(000)	3163.400 - 4298.238		535
H <sub>2</sub> <sup>18</sup> O	(100)-(000)	3001.891 - 4193.427		469
. - H <sub>2</sub> <sup>18</sup> O	(001)-(000)	3160.676 - 4340.151	5    9    8	

**Table 2. Rotational energy levels ( $\text{cm}^{-1}$ ) of the (001) and (100) vibrational states of  $\text{H}_2^{17}\text{O}$ . Estimated "uncertainties" given in ' $\text{cm}^{-1}$ ' -  $\times 10^5$**

J	K <sub>a</sub>	Kc	(001)	(100)	J	K <sub>a</sub>	Kc	(001)	(100)				
0	0	0	3748.31807	10	3653.14226	10	8	6	3	5108.92006	10	5029.00786	33
1	0	1	3771.8.6095	15	3676.52400	3	8	6	2	5108.96920	45	5029.02781	40
1	1	1	4783.90?39	5	3689.17431	18	8	7	2	5274.61150	150	5200.60222	50
1	1	0	3789.20217	10	3694.39500	10	8	7	1	5274.61150	150	5200.60222	50
2	0	2	3817.51409	2	3721.94883	7	8	8	1	5458.29876	30	5391.53415	60
2	1	2	3825.71633	4	3730.71710	4	8	8	0	5458.29876	30	5391.53415	60
2	1	1	3841.58152	7	3746.35251	10	9	0	9	4651.82743	10	4553.74226	40
2	2	1	3877.43858	3	3784.01921	8	9	1	9	4651.84839	20	4553.78478	10
2	2	0	3878.83895	6	3785.31937	6	9	1	8	4807.16175	6	4709.79165	10
3	0	3	3882.99302	5	3787.24098	7	9	2	8	4807.87035	5	4710.85178	40
3	1	3	3887.62564	6	3792.25525	7	9	2	7	4930.17007	4	4831.84526	35
3	1	2	3919.00154	3	3823.23808	10	9	3	7	4939.07021	12	4843.89790	170
3	2	2	3948.31771	4	3854.14435	10	9	3	6	5012.97965	25	4912.72631	9
3	2	1	3954.65561	4	3860.13522	4	9	4	6	5056.67115	9	4963.94255	250
3	3	1	4020.95113	5	3929.61786	6	9	4	5	5077.72631	15	4987.72949	9
3	3	0	4021.19496	12	3929.74821	4	9	5	5	5181.71327	7	5098.94381	8
4	0	4	3966.59425	4	3870.67749	4	9	5	4	5184.93775	6	5098.86644	35
4	1	4	3969.27935	7	3873.13462	8	9	6	4	5326.18185	25	5245.62708	100
4	1	3	4019.82271	10	3923.54217	4	9	6	3	5326.39935	25	5245.71304	10
4	2	3	4041.64371	7	3946.48766	11	9	7	3	5492.07087	25	<b>5417.36993</b>	300
4	2	2	4057.84.437	7	3961.82973	6	9	7	2	5492.07725	350	5417.37311	300
4	3	2	4116.33342	10	4025.20685	12	9	8	2	5676.53565	40		
4	3	1	4117.78566	6	4026.21155	20	9	8	1	5676.53565	40		
4	4	1	4214.56639	5	4127.72113	10	10	0	10	4842.72623	7	4743.95860	40
4	4	0	4214.60216	5	4127.59249	12	10	1	10	4842.73229	15	4743.98208	6
5	0	5	<b>4067.86422</b>	6	3971.71433	4	1	0	19	5016.94317	15	4919.10424	300
5	1	5	4068.62867	2	3972.80625	6	1	0	29	5017.44734	25	4919.62375	40
5	1	4	4141.69572	6	4045.07179	6	1	0	28	5160.82672	10	5062.59418	50
5	2	4	4157.26672	6	4060.15374	10	1	0	38	5165.50781	12	5069.29435	300
5	2	3	4187.67204	8	4091.26670	3	1	0	37	5263.93195	10		
5	3	3	4235.6-4213	5	4144.59505	5	1	0	47	5294.06197	12		
5	3	2	4240.12675	3	4147.98674	6	1	0	46	5345.28925	10	5239.90626	180
5	4	2	4335.03628	3	4249.82533	6	1	0	56	5422.67925	25	5326.23380	15
5	4	1	4335.33740	5	4248.77093	7	1	0	55	5430.72622	25	<b>5342.67699</b>	40
5	5	1	4457.02193	40	4373.40091	40	1	0	65	5567.32600300		5486.07889	40
5	5	0	4457.02615	8	4373.40171	10	1	0	64	5568.08645	30	5486.38054	300
6	0	6	4186.92222	7	4090.43266	10	1	0	74			5657.65633	300
6	1	6	4187.25228	3	4090.89232	<b>4</b>	1	0	73	5733.23417	40		
6	1	5	4282.22240	5	4185.57028	10	11	0	11	5051.52579	40	4952.01778	40
6	2	5	4288.33256	7	4194.19610	10	11	1	11	5051.52796	20	4952.04885	40
6	2	4	4342.27665	7	4244.82865	10	11	1	10	5244.37621	<b>15</b>		
6	3	4	4378.52498	4	4287.11428	5	11	2	10	5244.50863	<b>10</b>		
6	3	3	4399.26524	4	4302.16382	7	1	1	29	5407.94126	25		
6	4	3	<b>4479.84</b>	184	4387.17206	8	1	1	39	5410.27657	15		
6	4	2	4481.21259	6	4394.56753	15	<b>11</b>	<b>3</b>	<b>8</b>	5533.33257	40		
6	5	2	4601.83847	7	4518.07989	7	<b>11</b>	<b>4</b>	<b>8</b>	5533.33028	50		
6	5	1	4601.88843	10	4518.08801	30	1	1	47	5621.60364	15	5517.96607300	
6	6	1	4746.49200	80	4667.51172	15	1	1	57	5686.56764	30		
6	6	0	4746.49250	60	4667.51140	30	1	1	56	5703.46118	40	5612.89671	40
7	0	7	4323.90776	3	4226.97829	<b>6</b>	1	1	66	5832.12123	40		
7	1	7	4324.04026	8	4227.16496	<b>12</b>	1	1	65	5834.32472	50		
7	1	6	4440.03444	5	043.17974	<b>10</b>	12	0	12	5278.16485	40	5178.40101	300
7	2	6	4443.34298	3	4347.74861	<b>25</b>	12	1	12	5278.16565	80	5177.05495	300
7	2	5	4519.27514	<b>10</b>	4421.15734	10	12	1	11	5489.47765	40		
7	3	5	4544.28458	7	4451.85665	25	12	2	11	5489.53304	40		
7	3	4	4577.70564	<b>10</b>	4479.52923	9	12	2	10	5671.82977	40		
7	4	4	4648.74984	7	4556.90685	15	1	2	39	5819.20303	40		
7	4	3	4653.13608	4	4565.81927	<b>8</b>	1	2	49	5830.26057300			
7	5	3	4770.96047	5	4687.03830	<b>20</b>	1	2	48	5923.03321	200		
7	5	2	4771.23437	6	4687.07805	10	1	2	58	5972.54452300			
7	6	2	<b>4915.66732</b>	8	4836.28431	40	1	2	57	6002.73086	50		
7	6	1	4915.67534	20	4836.28742	20	13	0	13	5522.58392	20		
7	7	1	5080.94915	15	5007.49515	20	13	1	13	5522.58392	20		
7	7	0	5080.94915	<b>15</b>	5007.49515	20	<b>13</b>	<b>1</b>	<b>12</b>	5752.21200	500		
8	0	8	<b>4478.87693</b>	5	4381.45920	12	13	2	12	5752.23843	40		
8	1	8	4478.92941	25	4381.49044	10	13	2	11	5952.75250	200		
8	1	7	4614.93175	7	4517.89563	18	13	3	11	5953.27833	50		
8	2	7	4616.50215	10	4520.12709	40	13	3	10	6120.76700300			
8	2	6	4715.97970	4	4617.60571	40	13	4	10	6126.80902	50		
8	3	6	4731.63155	7	4637.79153	25	<b>14</b>	<b>0</b>	<b>14</b>	<b>5784.82645</b>	40		
8	3	5	4783.25092	<b>15</b>	4683.94527	10	<b>14</b>	<b>1</b>	<b>14</b>	5784.77631	40		
8	4	5	4841.26495	10	4749.24034	12	<b>14</b>	<b>1</b>	<b>13</b>	6032.58269	30		
8	4	4	4852.05825	6	4763.10323	15	<b>14</b>	<b>2</b>	<b>12</b>	6250.85811	300		
8	5	4	4964.32635	30	4880.43947	20	15	0	15	6064.38540	50		
8	5	3	4965.38853	6	<b>4880.55231</b>	<b>15</b>	<b>15</b>	<b>1</b>	<b>15</b>	6064.38540	50		

**Table 3. Rotational energy levels (cm<sup>-1</sup>) of the (001) and (100) vibrational states of H<sub>2</sub><sup>18</sup>O. Estimated uncertainties given in cm<sup>-1</sup> 10<sup>5</sup>**

J	K <sub>a</sub>	K <sub>c</sub>	(001)	(100)	J	K <sub>a</sub>	K <sub>c</sub>	(001)	(100)					
0	0	0	3741.56678	10	3649.68540	10	9	1	9	6643.32979	33	4548.48215	15	
1	0	1	3765.09081	6	3673.05009	3	9	1	8	4798.433s4	5	.4704 .30162	25	
1	1	1	3776.98503	10	3685.53272	10	9	2	8	4799.11091	6	4705.2s615	30	
1	1	0	3782.30160	7	3690.77404	10	9	2	7	4921.61288	5	4826.63156	8 0	
2	0	2	3810.68419	8	3718.41745	10	9	3	7	4930.22535	7	4838.09525	40	
2	1	2	3818.74415	4	3727.02111	4	9	3	6	5004.71998	20	4907.84471	9	
2	1	1	3834.65926	6	3742.71920	3	9	4	6	5047.41461	6	4957.34602	45	
2	2	1	3870.07803	5	3779.88620	3	9	4	5	5069.45685	30	4981.58277	10	
2	2	0	3871.49988	5	3781.20940	25	9	5	5	5171.29735	10	5090.66888	10	
3	0	3	3876.04052	9	3783.58525	10	9	5	4	5174.69051	15	5091.06685	2 0	
3	1	3	3880.56321	2 2	3788.46519	5	9	6	4	5314.25326	10	5236.12756	40	
3	1	2	3912.02834	8	3819.56442	7	9	6	3	5314.48513	7	5236.23179	15	
3	2	2	3940.91843	6	3849.%105	13	9	7	3	5478.42080	10	5406.04200	300	
3	2	1	3947.32976	6	3856.04393	3	9	7	2	5478.42970	3 0	5406.04826	40	
3	3	1	4012.86538	15	3924.67194	7	9	8	2	5661.01620	30			
3	3	0	4013.11596	9	3924.79604	6	9	8	1	5661.01620	30			
4	0	4	3959.46345	7	3866.83471	4	10	0	10	4833.83222	15	4738.26494	10	
4	1	4	3962.36785	4	3869.20412	6	10	1	10	4833.83755	30	4738.28690	35	
4	1	3	4012.74105	9	3919.77188	7	1	0	1	9	5007.78481	9	4913.16279	30
4	2	3	4034.20915	10	3942.21751	9	1	0	2	9	5008.10855	9	4913.64628	40
4	2	2	4050.54138	8	3957.48006	7	1	0	2	8	5151.72777	15	5056.79122	10
4	3	2	4108.42559	15	4020.22721	4	1	0	3	8	5156.21738	6	5063.10640	60
4	3	1	4109.97179	6	4021.20102	8	1	0	3	7	5255.30659	7	5157.97810	50
4	4	1	4205.47841	10	4121.38933	7	1	0	4	7	5284.56948	7	5193.482\$0	60
4	4	0	4205.51568	15	4121.31215	20	1	0	4	6	5336.47107	25	5234.082%	50
5	0	5	0360.51832	8	3%7.64363	8	1	0	5	6	5412.20825	25	5318.47283	15
5	1	5	4061.28012	3	3968.68738	15	1	0	5	5	5420.65414	3	5335.00275	60
5	1	4	4134.413%	5	4041.10791	6	1	0	6	5	5555.36961	10	5476.45376	30
5	2	4	4150.24588	5	4055.74723	5	1	0	6	4	5556.17899	15		
5	2	3	4180.31114	5	4087.16631	7	1	0	7	4	5719.49331	15	5646.20088	300
5	3	3	4227.83839	5	4139.56169	10	1	0	7	3	5719.53621	15		
5	3	2	4232.81215	25	4142.46868	12	1	0	8	3	5902.68520	20		
5	4	2	4325.95661	5	4242.98535	15	1	0	8	2	5902.68542	20		
5	4	1	4326.27067	5	4242.28762	11	1	1	11	5042.22019	40	4945.89326	10	
5	5	1	4446.67449	12	4365.88772	15	1	1	11	5042.22252	15	4945.92012	40	
5	5	0	4446.67968	10	4355.88897	15	1	1	10	5234.75974	6	5139.54865	25	
6	0	6	6179.33103	4	4086.10335	8	1	1	2	10	5234.8847S	11	5139.83861	40
6	1	6	4179.65094	4	4086.53874	10	1	1	2	9	5398.28271	10	5303.23145	40
6	1	5	4274.64406	6	4181.20421	25	1	1	3	9	5400.50643	8		
6	2	5	4280.84742	4	4189.59377	11	1	1	3	8	5524.15909	20	5426.86487	300
6	2	4	4334.80255	8	4240.67335	9	1	1	4	8	5542.47464	4		
6	3	4	4370.68155	7	4281.98749	9	1	1	4	7	5612.52199	40	5512.20890	300
6	3	3	4391.65303	7	4297.00422	9	1	1	5	7	5675.98316	10	5585.07229	40
6	4	3	4470.76908	6	4380.87731	5	1	1	5	6	5693.65517	40	5605.48287	40
6	4	2	4472.19937	5	4387.91083	7	1	1	6	6	5820.12753	35	5740.5.4381	40
6	5	2	\$4591.47669	10	4510.45231	10	1	1	6	5	5822.47291	40	5741.58776	50
6	5	1	4591.52928	20	4510.46651	10	1	1	7	5	5984.06926	80		
6	6	1	4734.64852	40	4658.34718	25	1	1	7	4	5984.24135	150		
6	6	0	4734.64955	40	4658.34772	25	1	2	0	12	5268.41380	80	5171.61187	40
7	0	7	4316.04093	10	4222.35902	8	1	2	1	12	5268.43030	80	5169.77109	40
7	1	7	4316.16787	8	4222.53453	20	1	2	1	11	5479.37313	20		
7	1	6	4432.09857	6	4338.51981	10	1	2	2	11	5479.42422	55	5384.10390	50
7	2	6	4435.32663	5	4342.88788	5	1	2	2	10	5661.60382	15		
7	2	5	4511.57291	5	4416.80386	10	1	2	3	10	5662.67037	50		
7	3	5	4536.21818	22	4446.57895	25	1	2	3	9	5809.35561	15		
7	3	4	4569.75867	3	4474.72438	25	1	2	4	9	5819.93673	5 0		
7	4	4	4639.66837	5	4550.18235	25	1	2	4	8	5913.69227	15		
7	4	3	4644.24533	7	4558.86959	20	1	2	5	8	5961.76223	40		
7	5	3	4760.58544	11	4679.27672	35	1	2	5	7	5993.24163	15		
7	5	2	4760.87461	5	4679.35281	20	1	2	6	7	6108.12702	100	6028.51890	5 0
7	6	2	4903.79514	20	4827.01377	15	1	2	6	6	6113.93560	40		
7	6	1	4903.80311	30	4827.01721	10	1	2	7	5	6272.51536200			
7	7	1	5067.39246	40	4996.41290	100	1	3	0	13	5512.35310	50	5414.05971	80
7	7	0	5067.39246	40	4996.41290	100	1	3	1	13	5512.35340	40	5414.05971	80
8	0	8	4470.70141	16	4376.49563	20	1	3	1	12	5741.59870	80		
8	1	8	4470.75185	30	4376.54335	4	1	3	2	12	5741.61135	40		
8	1	7	4606.60984	7	4512.83593	15	1	3	2	11	5941.94388	20		
8	2	7	4608.12213	20	4514.94633	15	1	3	3	11	5942.43866	40		
8	2	6	4707.90798	7	4612.89440	10	1	3	3	10	6110.19355	80		
8	3	6	4723.20405	15	4632. m	15	1	3	4	10	6115.93416	40		
8	3	5	4775.18847	4	4679.18888	15	1	3	4	9	6235.07799300			
8	4	5	4032.13416	8	4742.69215	15	1	3	5	9	6268.%517	40		
8	4	4	4843.39937	10	4756.42115	10	1	4	0	14	5774.07242	15		
8	5	4	4953.93685	10	4872.49703	8	1	4	1	14	5774.02957	10		
8	5	3	4955.05648	9	4872.75363	15	1	4	1	13	6021.40190	40		
8	6	3	5097.01901	10	5019.62548	10	1	4	2	13	6021.37622	40		
8	6	2	5097.07101	30	5019.64845	20	1	4	2	12	6239.44273	20		
8	7	2	5261.00390	50	5189.40106	40	1	5	0	15	6053.09646	110		
8	7	1	5261.01026	40	5189.40236	120	1	5	1	15	6053.09646	110		
8	8	1	5442.82656	15	5378.26560	60	1	5	2	14	6317.92450	50		
8	8	0	5442.82656	15	5378.26564	60	1	6	0	16	6349.80428	40		
9	0	9	94643.31014	5 5	4548.44168	8	1	6	1	16	6349.80428	40		

**Table 4. Dipole moment expansion coefficients derived from least-squares fits of H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O measured lines strengths in the (100)-(000) and (001)-(000) bands. Results derived without Fermi and /or Coriolis interactions included in the analyses. Values in Debyes.**

j	H <sub>2</sub> <sup>17</sup> O		(100)-(000) band		H <sub>2</sub> <sup>18</sup> O	
	this work 3200-3600 cm <sup>-1</sup>	Camy-Peyret et al. <sup>a</sup> 3601-4130 cm <sup>-1</sup>	Camy-Peyret et al. <sup>a</sup>	this work 3117-3500 cm <sup>-1</sup>	this work 3501-4153 cm <sup>-1</sup>	Flaud et al. <sup>b</sup>
1	1.505 (59)E-02	1.597 (79)E-02	1.464 (22)E-02	1.376(28)E-02	1.571 (70)E-02	1.427 (17)E-02
2	2.97 (161)E-05	-3.65 (233)E-05	2.72(145)E-07	-3.18 (27)E-05	2.37 (56)E-05	1.51 (69)E-07
3	-2.38 (180)E-04	-8.3 (368)E-05		3.45 (116)E-04	-1.18 (248)E-04	9.51 (678)E-06
4	-1.28 (65)E-03	-1.36 (24)E-03	-1.295 (39)E-03	-1.68 (14)E-03	-9.85 (146)E-04	-1.295 (24)E-03
5	6.29 (102)E-04	4.28 (39)E-04	5.54 (27)E-04	9.19 (42)E-04	4.63 (26)E-04	5.63 (19)E-04
6	-6.50 (960)E-05	-9.71 (136)E-05	-6.83 (307)E-07	7.47(108)E-05	-7.1 O(211)E-05	-2.15 (132)E-07
7	-2.8 (562)E-06	2.72(402)E-05	-4.38 (281)E-07	1. O(10)E-04	-4.98 (69)E-05	-3.39 (90)E-07
8	-2.69 (108)E-05	-1.32 (307)E-05		2.13 (34)E-05	-5.57 (195)E-05	
9	5.47 (908)E-05	-8.02 (159)E-05		-5.57 (52)E-05	-5.1 O(93)E-05	
10	-1.15 (132)E-04	9.38 (950)E-05		7.72 (44)E-05	-3.28 (76)E-05	
11	-2.33 (441)E-05	3.09 (55)E-05		2.70 (20)E-05	2.50 (43)E-05	
12	-8.85 (561)E-08	5.0(151) E-08		1.27 (191)E-08	1.79 (66)E-07	
13	4.14 (535)E-06	1.14 (182)E-06		-4.13 (80)E-07	-1.30 (16)E-06	
14	4.15 (933)E-05	3.6(998 )E-06		-2.07 (607)E-06	8.64( 139)E-05	
15	4.9(122 )E-06	1.98(227)E-05		4.2(265 )E-07	-1.69 (78)E-05	
16	4.16 (345)E-06	-3.36 (181)E-06		-5.90 (52)E-07	5.45( 60)E-07	
17	-5.62 (551)E-05	-1.49 (434)E-05		4.75( 181)E-05	-9.07 (437)E-05	
18	7.1(41 O)E-06	4.0(239 )E-06		3.77 (95)E-05	-3.23 (186)E-05	
19	-5.22 (623)E-05	3.40( 787)E-05		9.19 (63)E-05	-1.26 (28)E-04	
N	75	75		109	78	
$\sigma\%$	6.2	10.6		7.1	9.5	
(001)-(000) band						
j	this work	Camy-Peyret et al. <sup>a</sup>	this work	H <sub>2</sub> <sup>18</sup> O	Flaud et al. <sup>b</sup>	
1	7.133 (15)E-02	6.786(85)E-02	7.304 (8)E-02	6.850 (70)E-02		
2	1.193 (90)E-05	2.01( 74)E-05	6.95( 39)E-06	8.23( 450)E-06		
3	-7.72 (21)E-05	-8.59 (240)E-05	-1.016 (11)E-04	-6.62 (180)E-05		
4	-1.446 (6)E-03	-1.41 O(89)E-03	-1.425 (3)E-03	-1.407 (60)E-03		
5	-1.936 (85)E-05		-2.06(36)E-06			
6	6.006 (25)E-04	4.50( 35)E-04	5.143 (12)E-04	4.57( 22)E-04		
7	-5.148 (64)E-05	-1.04 (61)E-05	-1.780 (25)E-05	-9.67 (400)E-06		
8	6.81( 41)E-06	1.38(47)E-05	9.69( 21)E-06	1.55(36)E-05		
N	251		360			
$\sigma\%$	8 . 5		7.1			

a. Taken from Camy-Peyret et al., ref. 10. Values given above differ from those given in ref. 10 for the (100)-(010) band in which the Fermi interaction between the (020) and (100) states was removed.

b. Taken from Flaud et al., ref. 11. Values given above differ from those given in ref. 11 for the (100)-(000) band in which the Fermi interaction between the (020) and (100) states was removed.

c. N represent the number of line strengths used in the least-squares fit

d.  $\sigma\%$  is the standard deviation resulting from the least-squares fit in percent.

$u\% = \left[ \sum [(S_{obs} - S_{cal})^2 / S_{obs}]^{1/2} \right] \times 100$   
min and max v are given in cm<sup>-1</sup> and pertain to the minimum and maximum frequency range of transitions used the least-squares fits.

values given within parenthesis are estimated uncertainties in the last digit(s).

**Table 5. Line positions (cm<sup>-1</sup>) and strengths (cm<sup>-2</sup>/atm. at 296K) observed in the (100)-(000) band of H<sub>2</sub><sup>17</sup>O.**

observed position	o-c	upper J K <sub>a</sub> Kc	lower J K <sub>a</sub> Kc	observed strength %s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J K <sub>a</sub> Kc	lower J K <sub>a</sub> Kc	observed strength %s	(o-c)% <sup>a</sup> R		
3223.198	104	7 0 7	8 3 6	<b>9.40E-04</b>	2	-10.6	1.07	3437.8293	72	8 3 6	9 2 7	<b>3.47E-03</b>	3 4.49E-03 1.15
3223.6912	-51	7 1 6	8 4 5	<b>1.06E-03</b>	2	<b>1.32E-03</b>	1.17	3439.31318	-9	4 2 3	5 3 2	<b>7.61E-02</b>	4 2.4 1.11
*3229.1873	-6	7 7 0	8 8 1	<b>1.31E-03</b>	10	<b>1.71E-02</b>	1.21	3439.8751	-21	8 1 7	9 2 8	<b>5.00E-03</b>	2 2.3 1.14
3230.539	329	9 5 4	1 0 6	<b>4.04E-04</b>	10	<b>8.07E-04</b>		3441.7011	0	9 0 9	10 110	<b>1.86E-02</b>	2 -2.5 1.12
3238.858	-64	8 2 7	9 3 6	1.1 OE-O3	3	-2.7	1.13	3441.7598	<b>1</b>	9 1 9	10 010	<b>6.30E-03</b>	8 -1.0 1.13
3245.669	0	7 1 7	8 2 6	<b>4.18E-04</b>	10	<b>3.64E-04</b>		3443.3262	<b>10</b>	827	9 1 8	<b>1.41E-02</b>	3 -3.1 1.14
*3254.09063	-55	7 6 1	8 7 2	<b>2.70E-03</b>	5	<b>5.27E-03</b>	1.17	3444.19449	<b>-1</b>	5 2 3	6 3 4	<b>4.65E-02</b>	3 -4.4 1.08
3255.859	<b>23</b>	8 5 3	9 6 4	<b>4.66E-04</b>	10	<b>5.93E-04</b>		3444.3810	-2	3 3 1	4 4 0	<b>4.43E-02</b>	2 -6.0 1.12
3260.928	<b>-75</b>	6 1 5	7 4 4	<b>3.88E-04</b>	10	<b>6.42E-04</b>		3444.53918	0	330	4 4 1	<b>1.33E-01</b>	2 -5.8 1.11
3275.821	-91	6 0 6	7 3 5	<b>8.40E-04</b>	5	3.1		3459.52766	-17	7 1 6	8 2 7	<b>2.92E-02</b>	3 0.8 1.09
3276.5553	-5	8 4 5	9 5 4	3.02E-03	3	0.6	1.13	3459.65003	-2	4 2 2	5 3 3	<b>3.35E-02</b>	2 2.83E-02 1.08
3280.2355	-18	8 3 6	<b>9 4 5</b>	<b>2.34E-03</b>	6	-16.4	1.06	3463.31883	<b>13</b>	8 0 8	9 1 9	<b>1.26E-02</b>	2 -6.6 1.09
*3281.0922	-47	6 6 1	7 7 0	<b>6.30E-03</b>	4	-0.1	1.14	3464.5405	56	5 0 5	5 3 2	<b>1.50E-03</b>	10 2.00E-03 1.23
3281.8575	13	7 5 3	8 6 2	<b>1.12E-03</b>	3	-9.2	1.15	3466.6498	22	726	8 1 7	8.70E-03	6 9.26E-03 1.10
3281.9306	66	7 5 2	8 6 3	<b>3.50E-03</b>	<b>4</b>	-9.2	1.16	3471.96836	0	3 2 2	4 3 1	<b>4.42E-02</b>	2 -0.5 1.09
3292.878	31	8 4 4	9 5 5	<b>4.91E-04</b>	10	<b>1.00E-03</b>		3475.7640	-46	9 1 9	928	1.1 OE-O3	8 6.60E-04 1.28
3299.0917	23	7 2 6	8 3 5	<b>1.40E-03</b>	10	6.9	1.23	3476.9443	<b>173</b>	909	9 1 8	<b>2.59E-03</b>	10 2.01E-03 1.00
3305.616	30	7 4 4	8 5 3	<b>2.88E-03</b>	1.17			3477.17685	9	3 1 3	4 2 2	<b>1.80E-02</b>	2 4.4 1.11
3308.2615	3	6 5 2	7 6 1	8.62E-03	4	-4.4	1.17	3477.55388	-4	6 1 5	7 2 6	<b>1.45E-02</b>	4 1.68E-02 1.11
3308.277	238	6 5 1	7 6 2	<b>2.87E-03</b>	4	-4.5	1.15	3479.32928	<b>-1</b>	3 2 1	4 3 2	<b>1.42E-01</b>	2 3.5 1.09
3315.3212	62	7 4 3	<b>8 5 4</b>	<b>2.48E-03</b>	3	<b>6.99E-03</b>	1.10	3484.48750	6	707	8 1 8	<b>7.27E-02</b>	4 -4.4 1.10
3322.9188	29	7 3 5	8 4 4	<b>2.50E-03</b>	10	2.78E-03	1.03	3484.76650	<b>11</b>	7 1 7	808	<b>2.47E-02</b>	2 -2.7 1.12
3324.6423	<b>17</b>	5 0 5	6 3 4	<b>3.76E-03</b>	3	<b>4.45E-03</b>	1.07	3491.31017	4	6 2 5	7 1 6	<b>4.19E-02</b>	4 -6.1 1.10
3331.9169	<b>14</b>	6 4 3	7 5 2	<b>1.72E-02</b>	2	<b>1.49E-02</b>	1.06	3491.606	0	10 3 8	10 4 7	<b>5.68E-04</b>	10 4.71E-04
3335.0379	-6	9 3 6	1 0 4	<b>1.18E-03</b>	10	<b>1.49E-03</b>	1.06	3493.46235	-6	5 1 4	625	<b>8.32E-02</b>	3 5.8 1.08
3339.51378	36	<b>6 4 2</b>	7 5 3	<b>2.81E-03</b>	4	<b>4.97E-03</b>	1.18	3497.28877	-77	9 2 8	9 3 7	<b>7.77E-04</b>	10 2.94E-04 1.03
3346.4557	-8	8 3 5	9 4 6	<b>1.05E-03</b>	10	<b>1.28E-03</b>	1.06	3497.8375	<b>-103</b>	8 1 8	8 2 7	<b>6.90E-03</b>	10 5.51E-03 1.13
3353.3312	-3	6 2 5	7 3 4	<b>1.20E-02</b>	2	-2.8	1.08	3500.25145	0	2 2 1	3 3 0	<b>1.90E-01</b>	3 -5.8 1.08
3358.81841	0	6 3 4	7 4 3	<b>2.07E-02</b>	4	-0.8	1.07	3500.3600	-17	8 0 8	8 1 7	<b>2.17E-03</b>	4 1.89E-03 1.03
3360.0411	-10	7 3 4	8 4 5	<b>7.50E-03</b>	5	<b>9.37E-03</b>	1.07	3501.7S765	-6	2 20	33 1	<b>6.51E-02</b>	2 -3.1 1.10
3364.69339	25	<b>5 4 1</b>	6 5 2	<b>1.98E-02</b>	2	<b>3.07E-02</b>	1.10	3501.8530	26	7 4 4	7 5 3	<b>1.75E-03</b>	4 8.61E-07 1.43
3365.71130	-13	5 4 2	6 5 1	<b>3.77E-03</b>	5	<b>1.02E-02</b>	1.04	3503.0948	53	6 4 3	6 5 2	<b>6.40E-03</b>	4 4.00E-03 1.06
3368.4978	-1	4 0 4	5 3 3	<b>1.80E-03</b>	5	-6.0	1.17	3503.473	-22	3 0 3	3 3 0	1.1 OE-O3	10 1.74E-03 1.22
3370.8460	55	5 1 5	6 2 4	<b>2.88E-03</b>	6	2.5	1.06	3505.27072	0	606	7 1 7	<b>3.90E-02</b>	4 -8.0 1.04
3374.456	0	1 2 1 1 2 1 3 0 1 3		<b>1.00E-03</b>	10	4.5	1.13	3505.7372	<b>19</b>	6 3 4	7 2 5	<b>3.80E-03</b>	3 9.06E-03 1.07
3375.801	<b>0</b>	12 0 12 13 1 1 13		<b>3.30E-04</b>	10	<b>3.5</b>		3505.95145	2	6 1 6	707	<b>1.25E-01</b>	3 -1.4 1.13
3377.5215	<b>-79</b>	63 3	<b>7 4 4</b>	3.70E-03	5	<b>7.09E-03 0.96</b>		3506.408	-41	93	7 94 6	<b>7.65E-04</b>	10 6.99E-05
3388.8045	31	9 2 7	1 0 3 8	<b>2.43E-03</b>	4	-6.4	1.04	3508.2497	-1	7 4 4	8 3 5	<b>2.35E-03</b>	4 7.21E-04 1.00
3389.78320	<b>-4</b>	5 33	64 2	<b>1.52E-02</b>	4	3.4	1.09	3508.41413	-2	4 1 3	5 2 4	<b>3.93E-02</b>	2 6.5 1.08
3389.97204	16	4 4 0	5 5 1	<b>1.50E-02</b>	2	<b>2.14E-02</b>	1.12	3509.8293	60	9 1 8	927	<b>2.50E-03</b>	10 1.52E-03 1.03
3390.09718	20	<b>4 4 1</b>	5 5 0	<b>4.50E-02</b>	4	<b>6.42E-02</b>	1.18	3510.4529	-73	6 4 2	6 5 1	<b>7.00E-04</b>	10 1.33E-03 0.93
3394.28164	0	5 3 2	6 4 3	<b>5.40E-02</b>	3	<b>4.39E-02 1.14</b>		3511. O(5)X1	13	7 4 3	7 5 2	<b>1.64E-03</b>	10 3.35E-06 1.03
3397.3218	-20	1 0 1 9 1 1 2 1 2 1 0		<b>8.00E-04</b>	10	<b>8.27E-04</b>	1.04	3511.14647	-8	5 4 1	5 5 0	<b>2.86E-03</b>	5 1.53E-02 1.18
3397.6801	0	1 1 0 1 1 1 2 1 2 1 2		<b>3.14E-03</b>	2	6.4	1.15	3516.3462	44	8 2 7	8 3 6	5.73E-03	3 3.73E-03 1.01
3397.7142	0	11 1 1 1 2 0 1 2		<b>1.03E-03</b>	7	4 . 7	<b>1.13</b>	3518.1567	<b>-21</b>	<b>5 2 4 6 1 5</b>		<b>1.88E-02</b>	2 -2.7 1.14
3398.1062	0	1 0 2 9 1 1 1 1 0		<b>2.40E-03</b>	3	-4.0	1.06	3518.3033	-20	8 3 6	8 4 5	<b>3.80E-03</b>	4 2.43E-05 1.03
3400.16682	-13	<b>5 2 4</b>	6 3 3	1.09E-02	3	-2.3	1.07	3519.1486	0	<b>7 1 7</b>	7 2 6	<b>4.49E-03</b>	4 2.1 1.02
3404.0434	0	8 2 6	9 3 7	2.1 OE-O3	5	3.3	<b>1.11</b>	3519.28130	-2	2 1 2	3 2 1	<b>1.03E-01</b>	4 0.0 1.07
3406.4350	<b>-5</b>	3 0 3	4 3 2	<b>4.04E-03</b>	5	<b>4.87E-03</b>	1.08	3521.21784	<b>31</b>	9 5 4 1	1 0 4 7	<b>2.50E-03</b>	6 1.43E-03 1.28
3408.533	241	9 3 7	1 0 2 8	<b>6.08E-04</b>	10	<b>7.57E-04</b>		3522.8837	8	85	4 94 5	<b>8.18E-03</b>	3 2.67E-03 1.11
3417.37600	-1	7 2 5	8 3 6	<b>1.42E-02</b>	5	8.5	<b>1.14</b>	3523.79926	<b>10</b>	3 1 2	4 2 3	<b>1.52E-01</b>	2 6.2 1.09
3417.80940	-5	4 3 2	<b>5 4 1</b>	8.43E-02	3	2.7	1.10	3525.46940	3	505	6 1 6	<b>1.72E-01</b>	4 -8.2 1.02
3418.99312	0	9 1 8	10 29	6.72E-03	2	3.6	1.15	3527.086%	-7	5 1 5	6 0 6	<b>6.25E-02</b>	2 1.1 1.14
3419.05231	5	<b>4 3 1</b>	5 4 2	2.95E-02	2	<b>7.9</b>	1.10	3527.2150	<b>-12</b>	7 3 5	7 4 4	<b>2.85E-03</b>	4 5.40E-04 1.10
3419.83033	0	10 0 10 11 1 11	2 63E-03	<b>-1.1</b>	3	1.11		3533.1377	-16	72	6 73 5	<b>4.60E-03</b>	2 3.68E-03 1.09
3419.8605	-1	10 1 10 11 0 11	<b>8.32E-03</b>	5	4.2	1.17		3533.40918	0	6 3 4	6 4 3	<b>1.42E-02</b>	2 8.35E-03 1.04
3420.6236	0	9 28	10 1 9	<b>2.27E-03</b>	5	4.4	1.21	3536.3997	3	8 1 7	826	2.17E-03	4 1.2 1.00
3427.34146	28	4 1 4	5 2 3	<b>2.25E-02</b>	2	2.9	1.08	3537.4358	<b>4</b>	5 3 3	5 4 2	7.05E-03	2 -3.7 1.12
3429.7779	<b>41</b>	10 5 6	11 4 7	<b>1.20E-03</b>	10	<b>3.70E-04</b>	0.94	3539.28292	<b>-2</b>	6 1 6	6 2 5	2.76E-02	2 1.4 1.07
3430.2178	-10	6 2 4	7 3 5	<b>8.42E-03</b>	3	-2.9	1.02	3539.99813	<b>31</b>	4 3 2	4 4 1	<b>1.93E-02</b>	3 3.23E-02 1.09

Table 5 continued

observed position	o-c	upper J	K <sub>a</sub>	Kc	lower J	K <sub>a</sub>	Kc	observed strength	%s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	Kc	lower J	K <sub>a</sub>	Kc	observed strength	%s	(o-c)% <sup>a</sup> R		
3540.58929	-5	5	3	2	5	4	1	<b>2.67E-02</b>	3	<b>2.15E-02</b> <b>1.12</b>	3635.94947	-3	4	2	2	5	1	5	<b>6.85E-02</b>	2	<b>8.39E-04</b> <b>1.15</b>		
3540.87162	93	2	1	1	3	2	2	6.1	OE-02	3	7.2	1.12	3645.0217	-4	5	2	3	6	1	6	<b>3.76E-02</b>	2	1.65E-03 <b>1.20</b>
3540.9744	-31	4	3	1	4	4	0	<b>6.97E-03</b>	3	<b>1.07E-02</b> <b>1.09</b>	3659.666	-71	6	2	4	7	1	7	<b>1.76E-03</b>	10	<b>5.53E-04</b> <b>1.16</b>		
3543.0624	<b>-42</b>	8	5	3	9	4	6	<b>1.96E-03</b>	10	<b>1.12E-03</b> <b>1.22</b>	3662.7200	10	4	2	3	3	3	0	<b>2.15E-03</b>	10	2.53E-04 <b>1.25</b>		
3544.6883	-12	9	4	5	1	0	3	<b>1.90E-03</b>	10	<b>2.87E-04</b> <b>1.17</b>	3670.6213	-19	1	1	0	1	0	1	<b>1.86E-01</b>	2	-1.9 <b>1.12</b>		
3546.30727	8	6	4	3	7	3	4	<b>9.23E-02</b>	2	<b>3.18E-03</b> <b>1.09</b>	3676.3487	86	2	1	1	2	0	2	6.70E-02	3	1.0 <b>1.13</b>		
3547.12381	-9	6	2	5	6	3	4	<b>2.65E-02</b>	2	4.9	1.09	3678.268	-7	4	2	2	3	3	1	<b>1.04E-03</b>	5	<b>1.78E-04</b> <b>1.13</b>	
3547.3520	<b>-1</b>	6	3	3	6	4	2	2.05E-03	10	<b>2.74E-03</b> <b>0.96</b>	3678.6660	-49	7	2	5	8	1	8	<b>1.39E-03</b>	4	2.03E-03 <b>1.19</b>		
3547.60823	-3	4	2	3	5	1	4	<b>5.43E-02</b>	2	-7.5	1.11	3685.01780	8	2	0	2	1	1	1	<b>2.26E-02</b>	3	2.61 E-02 <b>1.10</b>	
3548.4365	67	6	0	6	6	1	5	<b>1.00E-02</b>	10	0.5	1.10	3687.02516	3	3	2	1	3	1	2	<b>9.89E-02</b>	2	<b>1.38E-01</b> <b>1.09</b>	
3548.47\$67	<b>4</b>	<b>4</b>	<b>1</b>	<b>4</b>	5	0	5	<b>2.15E-01</b>	2	-8.4	1.03	3689.09265	-16	3	1	2	2	2	1	<b>1.24E-02</b>	2	1.1 OE-02 <b>1.11</b>	
3549.5408	-12	8	4	4	9	3	7	<b>2.70E-03</b>	6	<b>2.38E-04</b> <b>1.14</b>	3689.17440	9	1	1	1	0	0	0	<b>4.07E-02</b>	2	-7.2 <b>1.11</b>		
3550.5765	-31	9	2	7	9	3	6	2.30E-03	5	<b>4.75E-04</b> <b>1.03</b>	3690.34887	4	2	2	0	2	1	1	<b>2.65E-02</b>	3	<b>3.24E-02</b> <b>1.14</b>		
3551.23347	<b>11</b>	7	3	4	7	4	3	<b>6.20E-03</b>	3	<b>1.86E-03</b> <b>1.02</b>	3692.38730	0	5	2	3	5	1	4	<b>1.00E-01</b>	5	<b>7.33E-02</b> <b>1.08</b>		
3555.007	-13	8	3	5	8	4	4	<b>1.23E-03</b>	10	<b>4.55E-05</b> <b>1.09</b>	3698.15188	-8	7	3	4	7	2	5	<b>2.36E-02</b>	2	<b>1.54E-02</b> <b>1.02</b>		
3556.323	13	8	6	3	9	5	4	<b>1.40E-03</b>	5	<b>1.11E-02</b> <b>1.23</b>	3698.8764	57	5	3	3	6	0	6	<b>1.08E-03</b>	10	6.04E-04 <b>1.40</b>		
3557.6784	<b>17</b>	5	1	5	<b>5</b>	<b>2</b>	<b>4</b>	<b>1.57E-02</b>	3	-2.6	1.06	3700.20319	17	6	3	3	6	2	4	3.20E-02	4	1.1 OE-02 <b>1.10</b>	
3557.97415	9	5	2	4	5	3	3	<b>1.41E-02</b>	2	-7.7	1.08	3700.5462	34	4	3	2	5	0	5	<b>2.97E-03</b>	4	<b>1.00E-03</b> <b>1.31</b>	
3558.1000	-16	7	5	3	<b>8</b>	<b>4</b>	<b>4</b>	<b>4.18E-03</b>	3	<b>1.51E-03</b> <b>1.24</b>	3701.9209	-46	4	1	3	4	0	4	<b>2.75E-02</b>	2	<b>2.48E-02</b> <b>1.13</b>		
3560.24973	0	1	1	0	2	2	1	<b>1.95E-01</b>	4	3.3	1.10	3702.19338	8	5	3	2	5	2	3	<b>2.02E-02</b>	2	<b>5.18E-02</b> <b>1.22</b>	
3561.80247	0	7	1	6	7	2	5	<b>1.67E-02</b>	2	<b>2.00E-02</b> <b>1.01</b>	3702.4479	<b>-14</b>	8	3	5	8	2	6	2.85E-03	10	<b>1.77E-03</b> <b>1.14</b>		
3562.03802	8	7	4	3	8	3	6	<b>2.78E-02</b>	2	<b>1.59E-03</b> <b>1.17</b>	3702.8320	18	6	2	4	6	1	5	<b>1.27E-02</b>	2	<b>1.14E-02</b> <b>1.03</b>		
3562.9370	25	3	0	3	4	1	4	<b>2.60E-01</b>	10	-3.8	1.04	3704.7920	13	2	2	1	2	1	2	<b>5.18E-02</b>	2	<b>6.25E-02</b> <b>1.10</b>	
3570.5835	81	3	2	2	3	3	1	<b>1.50E-02</b>	10	<b>2.01E-02</b> <b>1.04</b>	3706.4611	6	9	4	5	9	3	6	<b>2.72E-03</b>	7	<b>1.59E-03</b> <b>1.07</b>		
3570.63452	8	3	1	3	4	0	4	<b>7.98E-02</b>	2	-2.2	1.09	3706.94348	<b>-11</b>	2	1	2	1	0	1	<b>1.38E-01</b>	3	<b>1.56E-01</b> <b>1.09</b>	
3572.83489	-4	5	0	5	5	1	4	<b>5.50E-02</b>	3	-4.6	1.06	3708.01369	5	3	0	3	2	1	2	<b>1.06E-01</b>	3	<b>1.21E-01</b> <b>1.13</b>	
3573.69561	-9	4	1	4	4	2	3	<b>7.30E-02</b>	4	0.0	1.10	3710.4605	-27	5	2	3	4	3	2	<b>2.05E-03</b>	5	<b>6.21E-04</b> <b>1.27</b>	
3576.36750	4	3	2	1	3	3	0	<b>5.00E-02</b>	2	6.00E-02	1.10	3712.7633	-6	9	3	6	9	2	7	<b>2.15E-03</b>	7	<b>1.41E-03</b> <b>0.98</b>	
3579.0138	0	3	2	2	4	1	3	<b>1.32E-02</b>	10	-10.0	<b>1.14</b>	3714.4469	<b>81</b>	8	4	4	8	3	5	2.90E-03	10	<b>1.75E-03</b> <b>1.13</b>	
3579.65380	6	4	2	2	<b>4</b>	<b>3</b>	<b>1</b>	<b>2.26E-02</b>	4	<b>2.19E-02</b> <b>1.07</b>	3716.4415	<b>0</b>	1	1	5	6	1	1	<b>2.88E-04</b>	10	<b>6.88E-05</b>		
3580.0460	-42	2	0	2	3	1	3	<b>8.60E-02</b>	4	-0.8	1.05	3718.0607	<b>35</b>	<b>4</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>2</b>	6.05E-03	5	5.20E-03 <b>1.10</b>	
3580.2926	13	7	2	5	7	3	4	<b>1.50E-02</b>	10	<b>1.29E-02</b> <b>0.95</b>	3718.27137	0	7	2	5	7	1	6	<b>1.38E-02</b>	3	1.8 <b>1.00</b>		
3583.6095	2	<b>6</b>	<b>1</b>	<b>5</b>	6	2	4	<b>1.20E-02</b>	5	<b>1.65E-02</b> <b>1.0\$</b>	3720.4110	20	<b>5</b>	<b>1</b>	<b>4</b>	5	0	5	3.87E-02	2	8.6 <b>1.06</b>		
3584.09232	1	5	2	3	5	3	2	<b>4.48E-02</b>	3	<b>5.03E-02</b> <b>1.07</b>	3722.18365	22	4	2	3	4	1	4	<b>4.70E-02</b>	6	<b>5.31E-02</b> <b>1.14</b>		
3584.84186	0	6	2	4	6	3	3	<b>1.02E-02</b>	3	3.1	1.02	3722.2505	-8	<b>3</b>	<b>1</b>	<b>3</b>	2	0	2	<b>4.85E-02</b>	4	-4.7 <b>1.19</b>	
3585.788	-73	7	6	1	8	5	4	2.13E-03	10	2.04E-02	1.34	3724.1362	<b>16</b>	<b>3</b>	<b>3</b>	<b>1</b>	3	2	2	1.55E-03	10	<b>1.53E-02</b> <b>1.03</b>	
3586.77336	-7	3	1	3	3	2	2	<b>2.90E-02</b>	2	-3.3	1.04	3724.9538	-60	7	4	3	7	3	4	<b>2.65E-02</b>	7	<b>1.26E-02</b> <b>1.18</b>	
3589.7840	-2	6	5	2	7	4	3	<b>1.43E-02</b>	2	<b>1.02E-02</b> <b>1.23</b>	3725.76782	-11	4	3	2	4	2	3	<b>1.61E-02</b>	2	<b>5.56E-02</b> <b>1.17</b>		
3589.83850	-4	5	4	2	6	3	3	<b>1.11E-01</b>	4	<b>1.35E-03</b> <b>1.15</b>	3728.77508	0	4	0	4	3	1	3	<b>3.45E-02</b>	2	<b>3.87E-02</b> <b>1.15</b>		
3593.4468	32	6	5	1	7	4	4	4.80E-03	4	<b>3.57E-03</b> <b>1.2\$</b>	3728.8425	77	<b>4</b>	<b>4</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>1.44E-03</b>	10	<b>5.17E-04</b> <b>1.25</b>		
3594.14740	-6	6	3	3	7	2	6	<b>4.28E-02</b>	3	<b>2.37E-04</b> <b>1.16</b>	3729.4672	<b>17</b>	5	3	3	5	2	4	<b>6.20E-03</b>	4	<b>1.52E-02</b> <b>1.14</b>		
3594.17951	3	2	1	2	3	0	3	<b>1.95E-01</b>	2	-0.5	<b>1.10</b>	3734.5809	<b>16</b>	6	4	2	6	3	3	<b>3.48E-02</b>	2	<b>7.75E-03</b> <b>1.16</b>	
3595.8771	-22	7	3	4	8	2	7	<b>1.26E-02</b>	3	<b>1.81E-04</b> <b>1.12</b>	3736.5970	0	4	1	4	3	0	3	<b>1.21E-01</b>	4	-3.3 <b>1.21</b>		
3596.37734	-2	5	3	2	6	2	5	<b>2.46E-01</b>	2	<b>1.99E-03</b> <b>1.11</b>	3739.8515	44	6	1	5	6	0	6	<b>4.75E-03</b>	3	<b>5.35E-03</b> <b>1.04</b>		
3596.57180	-3	2	1	2	2	2	1	<b>7.50E-02</b>	<b>4</b>	-3.7	1.04	3740.09993	7	6	4	3	6	3	4	4.44E-02	2	<b>2.49E-02</b> <b>1.16</b>	
3597.29665	<b>-1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2.23E-01</b>	2	2.8	1.05	3741.59648	-6	<b>5</b>	<b>4</b>	<b>1</b>	5	3	2	<b>2.34E-01</b>	2	<b>3.21E-02</b> <b>1.12</b>	
3599.27842	7	5	1	4	5	2	3	<b>7.90E-02</b>	4	9.72E-02	1.02	3741.8321	-17	2	2	1	<b>1</b>	<b>1</b>	<b>0</b>	<b>1.15E-01</b>	3	2.9 <b>1.14</b>	
3601.69875	<b>2</b>	<b>5</b>	<b>4</b>	<b>1</b>	<b>6</b>	<b>3</b>	<b>4</b>	1.72E-01	2	<b>1.42E-02</b> <b>1.16</b>	3745.41640	-10	4	4	0	4	3	1	<b>1.06E-01</b>	2	<b>9.62E-03</b> <b>1.16</b>		
3608.46370	2	4	1	3	4	2	2	<b>4.42E-02</b>	2	5.3	1.0!	3745.4582	<b>-81</b>	8	4	5	8	3	6	<b>5.71E-04</b>	10	<b>7.03E-03</b>	
3610.9090	-12	2	2	1	<b>3</b>	<b>1</b>	<b>2</b>	<b>1.73E-02</b>	10	<b>2.15E-02</b> <b>1.05</b>	3745.6328	-7	<b>5</b>	<b>1</b>	<b>4</b>	4	2	3	<b>1.77E-02</b>	4	<b>1.32E-02</b> <b>1.17</b>		
3																							

**Table 5 continued**

observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R									
3759.1740	19	3	2	2	2	1	1	3.03E-02	3	2.73E-02	1.14	3894.5875	-84	7	3	4	7	0	7	1.60E-03	5	2.54E-03	1.23	
3760.9511	-34	8	5	4	8	4	5	1.15E-02	3	5.49E-03	1.18	3896.9199	-16	7	4	4	6	3	3	1.82E-02	4	5.05E-03	1.17	
3761.4543	-2	9	5	5	9	4	6	1.90E-03	6	7.43E-04	1.08	3903.4174	50	4	4	1	4	1	4	1.40E-03	10	2.41E-04	1.13	
3762.3956	-117	7	5	3	7	4	4	7.00E-03	10	3.47E-03	1.19	3905.702	122	7	5	2	7	2	5	7.80E-04	10	1.33E-03		
3762.5868	13	7	2	6	7	1	7	2.14E-03	7	2.58E-03	1.01	3908.3756	13	8	4	5	7	3	4	8.57E-03	2	7.98E-03	1.15	
3763.2762	0	6	5	1	6	4	2	1.08E-02	2	5.50E-03	1.21	3910.6823	-19	6	5	2	5	4	1	1.24E-02	2	2.48E-02	1.02	
3764.37479	0	6	5	2	6	4	3	3.33E-02	2	1.67E-02	1.20	3910.9284	-32	6	5	1	5	4	2	4.43E-03	5	8.30E-03	1.15	
3764.5521	-33	6	0	6	5	1	5	1.52E-02	2	-6.9	1.18	3918.74701	-6	7	4	3	6	3	4	5.20E-02	3	1.80E-02	1.13	
3766.00437	6	5	0	5	5	4	1	3.60E-02	3	1.71E-02	1.20	3922.9743	6	5	3	3	4	0	4	1.32E-03	2	1.08E-03	0.98	
3773.0280	-5	9	6	3	9	5	4	1.25E-03	10	-6.2	1.11	3927.9196	-25	7	3	4	6	2	5	1.98E-02	3	7.50E-03	1.11	
3773.37769	12	4	2	3	3	1	2	6.14E-02	2	5.24E-02	1.13	*3929.8885	93	6	6	1	5	5	0	1.15E-03	6	7.01E-03	0.74	
3775.4010	-54	9	6	4	9	5	5	5.44E-04	10	4.57E-07		3932.2265	-1	7	5	3	6	4	2	6.15E-03	5	6.77E-03	1.01	
3775.4970	-6	8	1	7	8	0	8	1.00E-03	10	4.6	1.08	3933.3730	5	7	5	2	6	4	3	1.59E-02	2	2.03E-02	1.05	
3777.6357	-54	8	2	7	8	1	8	2.64E-03	5	3.20E-03	1.02	3948.4926	12	8	4	4	7	3	5	7.00E-03	5	3.75E-03	1.23	
3777.7369	24	8	6	2	8	5	3	1.19E-03	4	6.7	1.35	3952.1437	10	8	5	4	7	4	3	2.07E-02	3	1.48E-02	1.07	
3778.5088	-37	8	6	3	8	5	4	3.21E-03	10	-2.0	1.19	3952.2096	-3	7	6	1	6	5	2	2.90E-03	7	7.77E-03	0.84	
3780.73330	-3	7	0	7	6	1	6	2.24E-02	2	-7.3	1.19	3954.6117	66	4	4	1	3	1	2	1.01E-02	3	2.92E-04	1.23	
3780.90786	-2	3	2	1	2	1	2	9.70E-02	2	4.61E-02	1.18	3955.9108	2	8	5	3	7	4	4	4.25E-03	3	5.21E-03	1.07	
3781.0322	8	7	6	1	7	5	2	6.50E-03	5	0.8	1.32	3962.4533	1	6	3	4	5	0	5	3.26E-03	2	-9.5	1.07	
3781.2302	0	7	6	2	7	5	3	2.22E-03	10	3.0	1.35	3966.473	249	6	5	2	6	2	5	2.66E-04	10	7.13E-04		
3781.44560	-14	7	1	7	6	0	6	7.75E-03	2	-2.1	1.21	3968.6778	-15	1	0	5	6	9	4	5	8.00E-03	6	5.17E-03	1.07
3783.3975	0	6	0	6	5	1	1	2.46E-03	5	2.78E-03	1.21	"3968.730	24	7	7	0	6	6	1	6.60E-04	10	3.85E-05	0.49	
3783.4340	7	6	6	1	6	5	2	7.95E-03	3	-4.9	1.30	3970.0057	3	9	5	5	8	4	4	6.83E-03	4	3.16E-03	1.07	
3785.0228	-39	5	2	4	4	1	3	1.22E-02	2	9.47E-03	1.14	3973.7528	24	8	6	3	7	5	2	3.28E-03	10	9.47E-03	0.94	
3791.5706	24	7	1	6	6	2	5	6.60E-03	5	4.85E-03	1.25	3973.9737	0	8	6	2	7	5	3	1.20E-03	10	3.17E-03	1.05	
3791.6893	-35	9	1	8	9	0	9	9.50E-04	10	1.12E-03	0.97	3974.6953	52	5	4	2	4	1	3	1.17E-02	2	4.14E-04	1.15	
3793.2100	-59	3	3	0	3	0	3	1.15E-03	3	9.96E-04	0.93	3974.9129	52	7	2	5	6	1	6	2.15E-03	2	2.1	1.09	
3794.18668	0	3	3	1	2	2	0	4.43E-02	2	3.16E-02	1.23	3975.9290	9	8	3	5	7	2	6	1.65E-03	4	1.0	1.18	
3795.31683	13	6	2	5	5	1	4	1.90E-02	2	1.30E-02	1.17	3979.3781	-31	9	5	4	8	4	5	6.62E-03	4	1.09E-02	1.04	
3795.60295	1	3	3	0	2	2	1	1.72E-01	4	9.42E-02	1.19	3983.9482	4	9	4	5	8	3	6	5.64E-03	2	6.97E-03	1.13	
3796.2970	-26	8	0	8	7	1	7	3.25E-03	2	-6.5	1.28	3988.29265	-1	6	4	3	5	1	4	4.23E-02	3	3.03E-03	1.17	
3796.54955	0	8	1	8	7	0	7	1.01E-02	3	-1.4	1.30	*3990	.7838	0	8	7	2	7	6	1	1.35E-03	3	0.2	0.86
*3797.6768	7	7	0	7	6	1	1	2.40E-03	10	4.64E-03	1.58	3995.2144	5	9	6	3	8	5	4	2.47E-03	5	9.01E-03	1.06	
3805.7515	-28	7	2	6	6	1	5	2.68E-03	5	1.77E-03	1.15	4005.1875	0	1	0	5	5	9	4	6	8.40E-04	10	2.24E-03	1.04
3809.8795	23	8	1	7	7	2	6	8.10E-04	10	-0.9	1.17	4006.1376	17	7	3	5	6	0	6	7.40E-04	10	1.22E-03	1.04	
3811.3862	-1	9	1	9	8	0	8	1.27E-03	6	-6.5	1.48	4012.189	0	9	7	3	8	6	2	2.30E-04	10	9.79E-04		
3813.7710	-7	4	3	2	3	2	1	9.63E-02	3	5.72E-02	1.23	4012.225	0	9	7	2	8	6	3	6.84E-04	10	2.94E-04		
3819.9271	-22	4	2	2	3	1	3	1.92E-01	6	6.03E-03	1.30	4013.3939	0	1	0	6	5	9	5	4	1.55E-03	10	6.55E-03	1.14
3823.3257	-5	5	3	2	5	0	5	3.85E-02	4	3.13E-03	1.13	4014.9101	8	7	4	4	6	1	5	3.68E-03	3	1.70E-03	1.04	
3825.8801	2	1	0	1	1	0	9	1.23E-03	10	1.58E-03		4016.155	0	1	0	6	4	9	5	5	5.39E-04	10	2.25E-03	
3841.3207	-14	6	3	4	5	2	3	1.92E-02	5	1.43E-02	1.19	4024.4672	50	5	4	1	4	1	4	4.27E-03	3	5.30E-04	1.18	
3843.95330	-7	4	4	1	3	3	0	7.68E-02	2	6.74E-02	1.08	4026.345	105	1	0	4	6	9	3	7	5.00E-04	10	1.44E-03	
3844.03083	0	4	4	0	3	3	1	1.66E-02	3	2.25E-02	1.02	4029.0745	10	9	3	6	8	2	7	1.60E-03	5	3.95E-03	1.14	
3849.8924	87	5	4	1	5	1	4	1.78E-02	3	1.95E-03	1.35	4032.447	323	8	2	6	7	1	7	4.01E-04	10	7.66E-04		
3852.57070	0	6	4	2	6	1	5	4.87E-03	2	1.17E-03	1.24	4032.814	0	1	0	7	4	9	6	3	5.42E-04	10	3.58E-03	
3856.4142	-6	8	3	6	7	2	5	2.10E-03	3	9.87E-04	1.18	4035.202	-636	1	1	5	6	1	0	4	7.50E-04	10	3.65E-03	1.11
3856.4449	30	6	3	3	6	0	6	5.93E-03	2	9.87E-04	1.18	4046.3543	-7	8	4	5	7	1	6	3.98E-03	3	6.37E-03	1.08	
3862.9336	30	7	4	3	7	1	6	4.90E-03	5	3.	WE-03	1.18	4052.8510	36	8	3	6	7	0	7	1.45E-03	4	3.79E-03	1.07
3866.9625	3	5	2	3	4	1	4	2.97E-02	3	6.58E-03	1.18	4068.6880	70	6	4	2	5	1	5	6.80E-04	10	3.53E-04	0.97	
3867.64935	1	5	4	2	4	3	1	1.35E-01	3	1.46E-02	1.11	4072.286	-45	6	5	2	5	2	3	4.89E-04	10	3.6		
3867.96495	-5	5	4	1	4	3	2	1.72E-01	2	4.44E-02	1.14	4074.925	0	1	1	4	7	1	0	4.19E-04	10	2.67E-03		
3879.99755	-12	6	4	3	5	3	2	3.39E-01	3	2.68E-02	1.24	4089.355	59	9	2	7	8	1	8	7.33E-04	10	2.81E-03	1.05	
3887.03580	0	6	3	3	5	2	4	6.37E-02	3	4.75E-03	1.12	4099.061	-120	8	5	4	7	2	5	6.49E-04	10	2.61E-03		
3888.6686	-63	4	3	2	3	0	3	5.00E-03	4	2.16E-03	1.11	4126.2710	15	1	0	5	6	9	2	7	2.44E-03	5	4.02E-03	1.04
3892.38775	-10	6	4	2	5	3	3	4.94E-02	2	9.53E-03	1.15													

• asterisk denotes a doubled absorption with the quantum state given for

**Table 6. Line positions (cm<sup>-1</sup>) and strengths (cm<sup>-2</sup>/ atm. at 296K) observed in the (100)-(000) band of H<sub>2</sub><sup>18</sup>O.**

observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R					
3117.0906	-70	9	2	7	1	0	5	6	8.27E-05	10	-8.4	3416.6569	10	4	3	1	5	4	2	2.94E-02	3	3.2	1.08			
3177.8608	55	8	8	1	9	9	0	1.90E-04	8	5.37E-05	1.04	3416.80447	5	1	0	1	1	1	1	2.64E-03	3	1.5	1.11			
3186.9072	57	10	5	6	11	1	65	1.93E-04	10	14.4	1.07	3416.8328	24	1	0	1	0	1	1	8.00E-03	3	2.5	1.13			
3198.2985	76	96	3	10	7	4		2.42E-04	4	3.06E-04	1.09	3417.5616	30	9	2	8	1	0	1	9	2.10E-03	4	-6.7	1.11		
*3200.0495	46	8	7	2	9	8	1	4.33E-04	3	2.5	0.99	3424.04570	16	4	1	4	5	2	3	2.22E-02	2	9.3	1.10			
3202.6257	-30	104	7	11	5	6		1.95E-04	4	-1.5	0.93	3424.2770	4	1	0	5	6	1	1	1.36E-03	4	3.25E-04	1.01			
3220.6527	-46	7	0	7	8	3	6	9.66E-04	3	-1.3	9	1.09	3434.09145	23	8	3	6	9	2	7	3.50E-03	3	7.35E-03	1.11		
3221.8837	12	7	1	6	8	4	5	1.03E-03	3	6.8	1.08	3436.48868	1	4	2	3	5	3	2	7.30E-02	4	3.1	1.07			
3225.2451	7	8	6	3	9	7	2	7.13E-04	3	8.67E-04	1.04	3436.92655	12	8	1	7	9	2	8	4.98E-03	2	-2.9	1.13			
3225.2746	90	86	2	9				2.38E-04	10	2.87E-04	1.04	3438.6395	-7	9	0	9	1	0	1	1.85E-02	2	-1.1	1.11			
*3227.61247	112	7	70	88	1			1.28E-03	6	8.71E-04	1.09	3438.6952	13	9	1	9	1	0	0	6.25E-03	3	0.1	1.13			
3228.6120	3	9	5	4	1	0	6	5	4.07E-04	4	5.66E-04	1.08	3440.1832	-5	8	2	7	9	1	8	1.42E-02	3	-8.2	1.14		
3235.14880	14	82	7	93	6			1.01E-03	2	1.5	1.06	3441.78372	4	5	2	3	6	3	4	4.79E-02	2	-4.4	1.11			
3241.1457	-41	94	6	10	5	5		2.70E-04	3	7.7	0.9\$	3441.99933	1	3	3	1	4	4	0	4.39E-02	2	-9.6	1.11			
3242.3120	-15	7	1	7	8	2	6	4.20E-04	4	-4.6	1.15	3442.15248	1	3	3	0	4	4	1	1.33E-01	2	-8.7	1.10			
*3252.3386	-35	7	6	1	8	7	2	2.63E-03	4	-7.9	1.04	3444.949	178	8	6	3	8	7	2	1.41E-04	10	7.79E-05				
3253.4410	-9	8	5	4	9	6	3	1.16E-03	3	1.66E-03	1.15	'3448.0297	-108	7	6	1	7	7	0	2.63E-04	5	3.72E-05	1.15			
3253.8570	-29	8	5	3	9	6	4	4.10E-04	10	5.56E-04	1.06	3450.0200	45	1	0	1	1	0	1	0	9.33E-04	3	3.8	0.97		
3259.3076	-71	6	1	5	7	4	4	4.80E-04	7	3.4	1.0\$	3450.5296	-49	1	0	0	1	0	1	9	2.95E-04	8	-1.7	0.92		
3272.0423	-21	94	5	10	5	6		6.44E-04	3	8.42E-04	1.08	3455.1094	19	1	1	1	1	0	1	2	2.43E-04	10	1.94E-04	0.93		
3273.3410	-59	6	0	6	7	3	5	7.10E-04	3	-4.8	1.0\$	3456.017	-95	1	0	5	6	1	0	6	1.64E-04	10	-6.4	0.96		
3274.0800	6	8	4	5	9	5	4	2.74E-04	3	2.42E-03	1.04	3456.60566	0	7	1	6	8	2	7	2.97E-02	3	-3.9	1.12			
3277.0920	39	83	6	94	5			2.35E-03	7	13.6	1.07	3456.88380	1	4	2	2	5	3	3	3.42E-02	2	2.93E-02	1.09			
*3279.3612	45	6	6	1	7	7	0	6.25E-03	3	4.3	1.04	3460.2020	-3	8	0	8	9	1	9	1.30E-02	2	-3.3	1.12			
3279.8135	14	7	5	3	8	6	2	1.15E-03	7	1.45E-03	1.12	3460.28555	-1	8	1	8	9	0	9	3.98E-02	2	-1.3	1.14			
3279.9248	5	7	5	2	863			3.45E-03	3	4.35E-03	1.08	3461.91460	-19	5	0	5	5	3	2	1.30E-03	5	-6.3	1.08			
3290.0750	10	5	1	4	643			1.37E-03	4	1.5	1.05	3463.39300	-1	7	2	6	8	1	7	9.22E-03	6	1.03E-02	1.16			
3295.55925	2	7	2	6	8	3	6	1.20E-03	3	9.9	1.07	3466.3566	3	7	3	5	8	2	6	1.60E-03	3	4.52E-03	1.12			
3302.9760	-19	7	4	4	8	5	3	2.00E-03	2	2.24E-03	1.05	3469.25840	-13	3	2	2	4	3	1	4.41E-02	2	-2.8	1.11			
3306.0861	22	6	1	6	7	2	5	3.20E-03	3	-0.8	1.07	3472.0106	-31	9	5	4	9	6	3	1.33E-04	10	3.84E-04	0.96			
3306.27735	0	65	2	76	1			8.26E-03	3	1.00E-02	1.06	3472.5725	-13	9	1	9	9	2	8	8.05E-04	4	-0.3	0.97			
3306.2970	0	6	5	1	7	6	2	2.60E-03	5	3.33E-03	1.00	3473.0695	53	8	5	4	8	6	3	2.75E-04	5	6.70E-04	1.03			
3312.50081	-13	7	4	3	8	5	4	4.18E-03	3	6.81E-03	1.06	3473.2900	-27	8	5	3	8	6	2	1.39E-04	10	2.25E-04				
3315.2268	-86	4	1	3	5	4	2	2.50E-04	5	-7.1	1.00	3473.67860	0	9	0	9	9	1	8	2.56E-03	3	5.4	1.03			
3320.1396	-19	7	3	5	8	4	4	2.55E-03	4	11.8	1.04	3474.00568	-5	3	1	3	4	2	2	1.75E-02	2	7.1	1.11			
3322.2612	20	5	0	5	6	3	4	3.75E-03	3	-2.4	1.07	3477.274	205	6	5	1	6	6	0	3.07E-04	2	5.2	1.02			
3322.4913	0	103	7	11	4	8		1.24E-04	10	1.74E-04	0.97	3475.1073	9	7	5	3	7	6	2	2.21E-04	2	3.12E-04	1.04			
3329.67405	0	6	4	3	7	5	2	1.32E-02	3	1.62E-02	1.06	3475.17768	-17	7	5	2	7	6	1	6.40E-04	2	9.39E-04	0.96			
*3332.69480	-3	5	5	0	6	6	1	2.41E-02	2	-10.7	1.07	3476.75233	2	3	2	1	4	3	2	1.41E-01	2	-2.5	1.09			
3333.3952	6	9	3	6	1	0	4	1.21E-03	2	-13.0	1.07	3477.2590	83	6	5	2	6	6	1	9.20E-04	2	5.1	1.03			
3344.7095	-3	83	5	94	6			1.07E-03	6	-9.4	1.07	3477.274	205	6	5	1	6	6	0	3.07E-04	2	5.2	1.02			
*3349.3868	0	130	1	3	14	1	14	5.20E-04	10	4.08E-04	1.26	3479.0153	-1	9	5	5	1	0	4	1.82E-03	3	3.11E-04	1.11			
3350.04430	7	6	2	5	7	3	5	1.17E-02	2	12.3	1.07	3481.36027	-1	7	0	7	8	1	8	7.47E-02	3	-3.6	1.14			
3350.3382	0	12	2	11	13	1	12	2.64E-04	10	2.90E-04	1.04	3481.62225	7	7	1	7	8	0	8	2.45E-02	3	-5.2	1.12			
3356.2877	4	6	3	4	7	4	3	2.12E-02	3	12.1	1.10	3485.5970	14	1	0	6	5	1	1	2.67E-04	5	2.31E-04	1.03			
3358.0880	-15	7	3	4	8	4	5	7.60E-03	4	8.75E-03	1.06	3486.1315	-69	4	0	4	4	3	1	5.60E-04	4	6.79E-04	1.03			
3362.21137	11	5	4	1	6	5	2	2.15E-02	3	3.45E-02	1.06	3487.8996	16	6	2	5	7	1	6	4.35E-02	4	5.33E-02	1.14			
3362.87095	23	5	4	2	6	5	1	4.96E-03	2	2.15E-02	1.05	3488.65627	-56	1	0	3	8	1	0	5.10E-04	10	3.61E-04	0.98			
3366.23840	-4	4	0	4	5	3	3	1.68E-03	3	-0.7	1.08	3490.65700	-6	5	1	4	6	2	5	8.60E-02	2	3.5	1.13			
3367.44940	-12	5	1	5	6	2	4	2.85E-03	3	6.2	1.02	3494.1101	-29	9	2	8	9	3	7	7.80E-04	4	6.68E-04	1.06			
3368.5047	-8	10	2	8	11	39		3.10E-04	7	4.45E-04	1.02	3494.62920	0	8	1	8	8	2	7	6.03E-03	2	1.4	1.02			
3370.8056	0	12	1	12	13	0	13	7.42E-04	2	9.93E-04	1.04	3494.8691	0	1	1	2	9	1	1	1.70E-04	10	1.03E-04	0.93			
3372.2098	-20	11	1	10	12	2	11	9.40E-04	4	2.6	1.12	3494.9499	18	34	9.3235	0	8	4	5	8	5	4	1.39E-03	3	1.94E-03	0.99
3372.61355	0	11	2	10	1	2	1	3.04E-04	3	-0.4	1.10	3497.0008	4	8	0	8	9	1	7	2.01E-03	4	1.2	1.00			
3372.6455	0	12	0	12	13	1	13	3.50E-04	5	5.5	1.17	3497.57910	-1	2	2	1	3	3	0	1.93E-01						

Table 6 continued

observed position	upper o-c	lower J	K <sub>a</sub>	Kc	observed strength	%s	(o-c)%*R	observed position	upper o-c	lower J	K <sub>a</sub>	Kc	observed strength	%s	(o-c)%*R		
3516.22184	1	2	1	2	3	2	1	<b>1.04E-01</b>	2	-7.0	1.11	3615.60512	-16	<b>1</b>	<b>1</b>	<b>1</b>	
3516.6177	<b>42</b>	9	5	4	1	0	4	<b>1.95E-03</b>	3	4.9	1.11	3620.71587	-1	4	4	0	
3517.2980	<b>24</b>	8	5	4	9	4	5	7.27E-03	2	<b>2.81E-03</b>	1.09	3623.6289	10	2	0	2	
3520.6649	21	7	0	7	7	1	6	<b>1.31E-02</b>	2	-5.1	1.01	3626.1760	14	3	3	0	
3520.94429	5	3	1	2	4	2	3	<b>1.57E-01</b>	4	0.4	1.15	3631.02665	-1	1	0	1	
3522.29740	0	5	0	5	6	1	6	<b>1.88E-01</b>	3	<b>1.1</b>	1.14	3632.2644	8	4	2	2	
3523.84115	0	5	1	5	6	0	6	<b>5.97E-02</b>	3	<b>-2.4</b>	1.11	3639.6409	-44	2	2	0	
3524.6829	-15	7	3	5	7	4	4	<b>2.54E-03</b>	3	-4.2	1.00	3641.3800	-16	6	1	6	
3526.69153	0	9	6	3	1	0	5	<b>6.51E-04</b>	3	<b>1.03E-03</b>	1.16	3641.81995	-13	5	2	3	
3530.1259	-22	7	2	6	7	3	5	<b>4.06E-03</b>	2	9.5	0.99	3653.6822	13	3	1	3	
3530.9546	12	6	3	4	6	4	3	<b>1.39E-02</b>	2	-6.9	1.03	3654.2281	18	5	1	5	
3532.6135	-7	8	1	7	8	2	6	<b>1.97E-03</b>	3	-4.2	0.94	3658.40514	30	<b>4</b>	<b>1</b>	<b>4</b>	
3535.0175	3	5	3	3	5	4	2	<b>6.40E-03</b>	4	<b>7.90E-03</b>	1.02	3659.8255	39	5	3	2	
3536.08780	-9	6	1	6	6	2	5	<b>2.52E-02</b>	2	3.3	1.02	3659.9097	-72	4	2	3	
3537.58365	1	4	3	2	4	4	1	<b>1.91E-02</b>	3	<b>2.65E-02</b>	1.09	3667.01914	0	1	1	0	
3537.67585	11	5	3	2	5	4	1	2.52E-02	2	10.6	1.05	3667.9294	33	8	4	5	
3537.96330	1	2	1	1	3	2	2	<b>5.90E-02</b>	2	-0.8	1.11	3672.79177	1	2	1	1	
3538.27428	0	8	5	3	9	4	6	<b>1.67E-03</b>	3	<b>1.08E-03</b>	1.14	3675.3854	-8	4	2	2	
3538.5285	10	4	3	1	4	4	0	<b>6.90E-03</b>	3	8.74E-03	1.06	3681.66875	-5	2	0	2	
3541.32775	-2	6	4	3	7	3	4	<b>1.04E-01</b>	3	<b>8.93E-03</b>	1.11	3683.1610	-2	3	2	1	
3541.61900	3	4	0	4	5	1	5	<b>8.23E-02</b>	2	3.2	1.14	3683.22772	-3	3	1	2	
3543.85692	-7	4	2	3	<b>5</b>	<b>1</b>	<b>4</b>	5.50E-02	2	<b>7.97E-02</b>	1.13	3685.53272	0	1	1	1	
3544.21108	-6	6	2	5	6	3	4	<b>2.56E-02</b>	2	2.1OE-02	1.08	3686.08862	0	3	1	2	
3544.92335	<b>17</b>	6	0	6	6	1	5	<b>8.72E-03</b>	3	-4.0	1.00	3686.4206	-15	2	2	0	
3545.15733	<b>-4</b>	<b>4</b>	<b>1</b>	<b>4</b>	5	0	5	<b>2.30E-01</b>	5	-0.4	1.13	3688.8058	1	5	2	3	
3545.7960	-51	1	0	4	6	1	1	3	<b>1.50E-04</b>	10	<b>2.78E-04</b>	3	3694.27147	-5	7	3	4
3546.8345	<b>61</b>	9	2	7	9	3	6	<b>2.06E-03</b>	3	11.2	0.96	3695.76645	9	6	3	3	
3549.0251	55	7	3	4	7	4	3	<b>5.80E-03</b>	4	<b>6.66E-03</b>	0.95	3697.31010	0	5	3	2	
3550.74968	8	1	1	1	2	2	0	<b>5.41E-02</b>	2	-3.2	1.11	3698.2101	41	6	3	4	
3551.01323	<b>-4</b>	8	6	3	9	5	4	<b>1.29E-03</b>	4	1.56E-03	<b>1.17</b>	3698.53787	0	4	1	3	
3552.7502	48	8	3	5	8	4	1	<b>1.00E-03</b>	3	3.5	0.89	3698.9665	0	8	3	5	
3552.8370	-56	7	5	3	8	4	4	3.60E-03	7	<b>1.50E-03</b>	1.18	3699.4932	<b>1</b>	6	2	4	
3553.6292	-88	8	6	2	9	5	4	<b>4.05E-04</b>	5	<b>5.34E-04</b>	1.13	3699.7145	<b>-8</b>	1	0	4	
3554.5192	5	1	5	5	2	4	4	<b>1.48E-02</b>	3	<b>6.4</b>	<b>1.04</b>	3700.89757	2	2	2	1	
3555.15095	-:	5	2	4	5	3	3	<b>1.30E-02</b>	2	<b>1.17E-02</b>	<b>1.03</b>	3703.26600	-21	2	1	2	
3557.16383	10	7	4	3	8	3	6	<b>3.31E-02</b>	2	6.36E-03	1.15	3704.59660	0	3	0	3	
3557.29828	4	<b>1</b>	<b>1</b>	<b>0</b>	2	2	1	<b>1.95E-01</b>	4	<b>0.3</b>	<b>1.13</b>	3707.8745	-19	5	2	3	
3558.06695	0	7	1	6	7	2	5	<b>1.53E-02</b>	3	<b>3.3</b>	<b>0.97</b>	3708.3930	1	3	2	2	
3559.7567	<b>1</b>	3	0	3	4	1	4	<b>2.88E-01</b>	4	7.5	1.17	3709.0925	0	8	4	4	
3562.7166	<b>2</b>	7	5	2	8	4	5	<b>9.20E-03</b>	2	<b>4.90E-03</b>	1.15	3709.6451	<b>5</b>	9	3	6	
3562.92604	15	4	2	3	4	3	2	<b>5.40E-02</b>	2	<b>4.92E-02</b>	1.11	3715.0161	<b>13</b>	4	1	3	
3565.56575	0	8	2	6	8	3	5	<b>1.95E-03</b>	3	12.1	0.93	3715.10949	-4	7	2	5	
3567.23117	-1	3	1	3	4	0	4	<b>8.20E-02</b>	3	0.7	1.15	3716.0330	-9	8	3	6	
3567.86660	13	3	2	2	3	3	1	<b>1.65E-02</b>	7	3.3	1.18	3717.06120	<b>4</b>	5	1	4	
3569.28317	6	5	0	5	5	1	4	<b>5.18E-02</b>	2	2.7	1.06	3718.38890	-5	4	2	3	
3570.3450	-12	8	7	2	9	6	3	<b>2.90E-04</b>	5	0.1	1.31	3718.53780	5	3	1	3	
3570.58391	-3	<b>4</b>	<b>1</b>	<b>4</b>	4	2	3	<b>7.04E-02</b>	2	10.7	1.10	3719.31985	-20	7	4	3	
3573.73685	1	<b>3</b>	<b>2</b>	<b>1</b>	3	3	0	<b>4.91E-02</b>	3	-1.6	1.10	3721.6070	-3	4	3	2	
3577.2544	8	7	2	5	7	3	4	<b>1.56E-02</b>	5	<b>1.26E-02</b>	1.03	3725.26665	0	4	0	4	
3579.8075	-11	7	6	2	8	5	3	<b>6.50E-04</b>	5	-2.2	1.26	3725.3935	0	5	3	3	
3580.64855	-1	<b>7</b>	<b>6</b>	<b>1</b>	<b>8</b>	<b>5</b>	<b>4</b>	<b>1.94E-03</b>	3	-3.6	1.26	3729.30068	-5	6	4	2	
3581.43750	3	5	2	3	5	3	2	<b>4.34E-02</b>	4	5.3	1.06	<b>3731.53661</b>	<b>3</b>	6	3	4	
3582.06325	-1	6	2	4	6	3	3	<b>9.70E-03</b>	3	<b>8.45E-03</b>	1.00	3732.86740	-5	4	1	4	
3583.70928	0	3	1	3	3	2	2	<b>3.15E-02</b>	8	<b>2.70E-02</b>	1.21	3733.3994	-13	8	2	6	
3584.37525	0	5	4	2	6	3	3	<b>8.55E-02</b>	3	<b>3.38E-03</b>	<b>1.14</b>	3735.26750	-8	9	5	4	
3584.75247	<b>-1</b>	6	5	2	7	4	3	<b>1.29E-02</b>	3	<b>5.68E-03</b>	1.21	3736.35793	-5	6	1	5	
3590.40633	-6	6	3	3	7	2	6	<b>2.95E-02</b>	2	<b>2.29E-03</b>	1.16	3736.5585	-28	5	4	1	
3590.68442	-2	<b>2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>1.97E-01</b>	3	-1.6	1.14	3737.8627	<b>-7</b>	2	2	1	
3592.8100	-23	7	3	4	8	2	7	<b>1.08E-02</b>	2	3.55E-03	<b>1.17</b>	3739.9811	-2	7	3	5	
3593.54533	2	2	1	2	<b>2</b>	<b>2</b>	<b>1</b>	<b>7.44E-02</b>	3	0.1	1.10	3740.60958	-5	4	4	0	
3594.06145	1	<b>1</b>	<b>0</b>	<b>1</b>	2	1	2	<b>2.23E-01</b>	2	2.0	1.13	3740.9863	<b>1</b>	8	4	5	
3595.94935	2	<b>5</b>	<b>1</b>	<b>4</b>	5	2	3	<b>7.75E-02</b>	2	<b>6.80E-02</b>	1.04	3742.09766	-5	4	4	1	
3596.90500	1	<b>5</b>	<b>4</b>	<b>1</b>	6	3	4	<b>1.33E-01</b>	3	<b>1.08E-02</b>	<b>1.16</b>	3742.38905	-3	5	4	2	
3603.2794	4	8	3	3	5	9	2	<b>6.50E-04</b>	3	1.6	1.18	3742.48740	-33	5	1	4	
3605.3125	8	<b>4</b>	<b>1</b>	<b>3</b>	4	2	2	<b>4.11E-02</b>	2	<b>3.73E-02</b>	1.05	3743.81515	8	5	0	5	
3607.03275	-8	4	3	1	5	2	4	<b>2.54E-02</b>	4	4.92E-03	1.25	3744.24750	-4	6	2	5	
3607.14388	-4	<b>6</b>	<b>6</b>	<b>1</b>	7	5	2	<b>1.67E-03</b>	4	2.9	1.28	3747.4538	43	<b>5</b>	<b>1</b>	<b>5</b>	
3607.3572	-22	6	6	0	7	5	3	<b>5.50E-04</b>	4	1.7	1.27	3750.3763	-43	8	3	6	
3607.93607	-1	2	1	1	2	2	0	3.55E-02	2	2.0	1.11	3753.1957	86	1	0	4	
3608.76522	8	3	1	2	3	2	1	<b>1.48E-01</b>	5	8.6	1.10	3753.65303	5	7	5	2	
3610.70229	-5	3	0	3	3	1	2	<b>1.57E-01</b>	4	4.6	1.11	3754.74185	-16	7	1	6	
3612.93675	0	0	0	1	1	1	1	5.1OE-02	2	-3.8	1.10	3755.1724	<b>0</b>	3	2	2	
3613.7004	20	5	5	1	6	4	2	<b>3.06E-03</b>	3	<b>1.48E-03</b>	<b>1.18</b>	3755.86088	<b>8</b>	8	5	4	
3614.85586	-10	5	5	0	6	4	3	9.1OE-03	2	<b>4.49E-03</b>	<b>1.18</b>	3756.1899	37	9	5	5	

**Table 6 continued**

observed position	upper o-c	J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(O-c)% <sup>a</sup>	R	observed position	upper o-c	J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup>			
3757.38043 -39	7	5	3	7	4	4		<b>6.24E-03</b>	2	<b>2.08E-03</b>	.14	3898.9003	35	7	5	2	7	2	5	<b>6.90E-04</b>	5	<b>1.44E-03</b>	1.30		
3758.27905 6	6	5	1	6	4	2		<b>9.77E-03</b>	2	<b>3.73E-03</b>	.18	3903.14248	-13	8	4	5	7	3	4	<b>7.50E-03</b>	6	<b>1.62E-03</b>	1.13		
3758.9016 25	7	2	6	7	1	7		<b>2.02E-03</b>	7	<b>2.32E-03</b>	.02	3905.6591	-27	6	5	2	5	4	1	<b>1.04E-02</b>	2	<b>1.39E-02</b>	0.98		
3759.4189 -40	6	5	2	6	4	3		<b>3.16E-02</b>	2	<b>1.14E-02</b>	.22	3905.9221	-19	6	5	1	5	4	2	<b>3.24E-03</b>	3	<b>4.65E-03</b>	0.97		
3760.8871 -51	6	0	6	5	1	5		<b>1.28E-02</b>	2		1.6	3906.8195	-19	9	4	5	9	1	8	<b>3.50E-04</b>	4	<b>8.79E-04</b>	1.37		
3761.09617 14	5	5	0	<b>5</b>	<b>4</b>	<b>1</b>		<b>3.41E-02</b>	3	<b>1.57E-02</b>	.21	3909.2287	5	6	5	1	6	2	4	<b>1.88E-04</b>	8	<b>4.02E-04</b>			
3761.34350 0	5	5	1	5	4	2		<b>1.12E-02</b>	2	<b>5.26E-03</b>	.19	3910.0174	3	9	4	6	8	3	5	<b>3.30E-04</b>	4	<b>4.15E-04</b>	1.01		
3762.4918 -19	6	1	6	5	0	5		<b>4.1OE-02</b>	2		4.3	3913.48696	0	7	4	3	6	3	4	<b>6.04E-02</b>	3	<b>3.67E-03</b>	1.14		
3767.0360 -2	6	1	5	5	2	4		<b>3.40E-03</b>	6	<b>5.47E-03</b>	.11	3915.4576	-2	6	2	4	5	1	5	<b>1.28E-03</b>	5	<b>9.05E-04</b>	1.08		
3767.6193 -28	9	6	3	9	5	4		<b>1.24E-03</b>	2	<b>2.03E-03</b>	.14	3920.731	<b>61</b>	5	5	0	5	2	3	<b>1.84E-04</b>	10	<b>6.24E-04</b>	1.36		
3769.33458 -2	4	2	3	3	1	2		<b>5.80E-02</b>	2		0.3	3924.2733	<b>-23</b>	7	3	4	6	2	5	<b>1.58E-02</b>	2	<b>2.80E-03</b>	1.12		
3771.4219 67	7	2	5	6	3	4		<b>5.96E-04</b>	10	<b>1.19E-03</b>	.08	3924.6652	<b>112</b>	6	6	1	5	5	0	<b>1.11E-03</b>	3	<b>2.31E-02</b>	0.64		
3771.9234 -20	8	1	7	8	0	8		<b>8.40E-04</b>	10	<b>1.28E-03</b>	.06	3927.0892	0	7	5	3	6	4	2	<b>5.79E-03</b>	4	<b>1.78E-03</b>	1.08		
3772.4426 31	8	6	2	8	5	3		1.1 OE-O3	10		-7.2	1.28	3928.3197	-10	7	5	2	6	4	3	<b>1.45E-02</b>	2	<b>5.49E-03</b>	1.07	
3773.25688 5	8	6	3	8	5	4		<b>3.16E-03</b>	2	<b>3.60E-03</b>	1.20	3943.65936	-3	8	4	4	7	3	5	<b>6.19E-03</b>	2	<b>8.05E-04</b>	1.10		
3773.9475 -9	8	2	7	8	1	8		<b>2.60E-03</b>	6	<b>3.56E-03</b>	.07	3946.79713	-7	8	5	4	7	4	3	<b>1.92E-02</b>	4	<b>2.92E-03</b>	1.14		
3774.8391 5	1	0	3	8	1	0	2	<b>3.55E-04</b>	10	<b>1.41E-03</b>	.09	3946.8992	6	7	6	2	6	5	1	<b>1.00E-03</b>	10	<b>2.11 E-03</b>	0.96		
3775.8140 5	7	6	1	7	5	2		<b>6.06E-03</b>	3		4.0	1.25	3948.5066	18	4	4	1	3	1	2	<b>6.60E-03</b>	8	<b>6.34E-04</b>	1.18	
3776.0235 3	7	6	2	7	5	3		<b>2.05E-03</b>	2		5.1	1.27	3950.8572	-53	8	5	3	7	4	4	<b>3.80E-03</b>	3	<b>1.07E-03</b>	1.09	
3777.01279 0	7	0	7	6	1	6		<b>1.85E-02</b>	5		3.6	1.12	3957.94083	9	6	3	4	5	0	5	<b>2.91E-03</b>	3	<b>1.38E-03</b>	1.03	
3777.05526 -2	3	2	1	2	1	2		<b>1.00E-01</b>	3	<b>5.00E-02</b>	1.17	3963.2188	4	7	7	0	6	6	1	<b>8.20E-04</b>	4	<b>3.78E-04</b>	0.71		
3777.68810 -20	7	1	7	6	0	6		<b>6.30E-03</b>	4		3.2	1.13	3963.2737	<b>14</b>	1	0	5	6	9	4	5	<b>8.80E-03</b>	3	<b>1.73E-03</b>	1.13
3778.2333 21	6	6	0	6	5	1		<b>2.54E-03</b>	3		1.0	1.26	3964.2297	-2	9	5	5	8	4	4	<b>6.47E-03</b>	3	<b>7.29E-04</b>	1.14	
3778.2711 28	6	6	1	6	5	2		<b>7.60E-03</b>	3		0.7	1.26	3968.1822	6	5	4	2	4	1	3	<b>8.40E-03</b>	4	<b>4.02E-04</b>	1.13	
3780.9441 8	5	2	4	<b>4</b>	<b>1</b>	<b>3</b>		<b>1.08E-02</b>	2	<b>1.25E-02</b>	1.10	3968.4220	-22	8	6	3	7	5	2	<b>3.13E-03</b>	2		-6.7	0.98	
3788.0438 -3	9	1	8	9	0	9		<b>9.45E-04</b>	10	<b>2.06E-03</b>	1.02	3968.65800	-15	8	6	2	7	5	3	<b>1.12E-03</b>	4		-0.2	1.07	
3788.0692 24	7	1	6	6	2	5		<b>5.18E-03</b>	2	<b>1.12E-02</b>	1.11	3971.45762	-1	7	2	5	6	1	6	<b>1.93E-03</b>	3	<b>1.28E-03</b>	1.08		
3788.4595 13	3	3	0	3	0	3		<b>1.93E-03</b>	4	<b>1.50E-03</b>	1.07	3972.5910	-5	8	3	5	7	2	6	<b>1.43E-03</b>	4	<b>5.97E-04</b>	1.19		
3789.88881 -1	3	3	1	2	2	0		<b>4.45E-02</b>	3	<b>2.87E-02</b>	1.21	3973.420	128	11	5	7	104	6		<b>1.99E-04</b>	10	<b>4.15E-04</b>	1.19		
3789.938 -100	<b>8</b>	<b>7</b>	<b>1</b>	8	6	2		<b>4.00E-04</b>	10	<b>5.55E-04</b>	1.44	3974.4312	58	9	5	4	8	4	5	<b>6.05E-03</b>	5	<b>2.67E-03</b>	1.09		
3789.9730 0	8	7	2	8	6	3		1.1OE-03	10	<b>1.67E-03</b>	1.31	3979.7447	61	440		3	<b>1</b>	3		<b>6.87E-04</b>	10	<b>1.42E-04</b>	1.15		
3791.23336 11	<b>6</b>	<b>2</b>	<b>5</b>	<b>5</b>	<b>1</b>	<b>4</b>		1.65E-02	2	<b>2.31E-02</b>	1.12	3979.8770	9	9	4	5	8	3	6	<b>4.73E-03</b>	3	<b>2.12E-03</b>	1.08		
3791.32021 -3	3	3	0	2	2	1		<b>1.90E-01</b>	2	<b>8.61E-02</b>	1.22	3982.51683	4	6	4	3	<b>5</b>	<b>1</b>	<b>4</b>	<b>4.08E-02</b>	3	<b>1.40E-03</b>	1.14		
3792.2400 206	7	7	0	7	6	1		<b>1.88E-03</b>	2	<b>2.15E-03</b>	1.20	3985.2273	130	8	7	2	7	6	1	<b>1.28E-03</b>	4	<b>4.06E-04</b>	0.91		
3792.76555 0	8	1	8	7	0	7		<b>7.60E-03</b>	3		-0.7	1.16	3988.9214	0	9	6	4	8	5	3	<b>7.80E-04</b>	4	<b>8.66E-04</b>	1.05	
3799.9673 29	<b>4</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>4</b>		<b>3.50E-03</b>	7	<b>8.02E-04</b>	1.17	3989.8633	<b>16</b>	9	6	3	<b>8</b>	<b>5</b>	<b>4</b>	<b>2.22E-03</b>	3	<b>2.65E-03</b>	1.04		
*3803.5874 6	8	8	1	8	7	2		<b>3.30E-04</b>	8	4.07E-06	1.29	3990.5827	-18	85		4	82		7	<b>1.23E-04</b>	10	<b>1.37E-03</b>			
3809.42793 0	4	3	2	3	2	1		<b>9.40E-02</b>	3	<b>4.18E-02</b>	1.18	3999.2786	-57	8	8	1	7	7	0	<b>3.17E-04</b>	6	<b>1.18E-02</b>	0.65		
3813.2519 -10	8	2	7	7	1	6		<b>2.35E-03</b>	3	<b>8.90E-03</b>	1.12	4000.5236	20	1	0	5	5	9	4	6	<b>8.00E-04</b>	10	0.3	1.15	
3815.91200 0	4	2	2	3	1	3		<b>3.60E-01</b>	5	<b>6.80E-01</b>	1.12	4001.7330	28	73		5	60		6	<b>7.16E-04</b>	2	<b>3.36E-04</b>	1.10		
3816.44518 7	4	3	1	3	2	2		<b>1.15E-01</b>	5	<b>1.38E-02</b>	1.26	4006.5808	216	9	7	3	8	6	2	<b>2.40E-04</b>	8	<b>2.17E-04</b>	0.92		
3818.42190 -3	5	3	2	5	0	5		6.55E-02	3	1.67E-03	1.14	4006.6202	0	9	7	2	8	6	3	<b>7.88E-04</b>	3	<b>6.50E-04</b>	1.01		
3821.9713 -4	10	0	10	9	1	9		<b>1.84E-04</b>	5	<b>4.95E-04</b>	1.16	4007.8414	-15	1	0	6	5	9	5	4	<b>1.44E-03</b>	2	<b>2.24E-03</b>	1.17	
3822.0288 -31	10	1	10	9	0	9		<b>5.42E-04</b>	10	<b>1.49E-03</b>	1.13	4009.00233	15	7	4	4	6	1	5	<b>2.63E-03</b>	2	<b>4.82E-04</b>	1.11		
3822.3872 -27	9	1	8	8	2	7		<b>5.53E-04</b>	2	<b>5.98E-03</b>	1.12	4018.4593	23	5	4	1	4	1	4	<b>3.08E-03</b>	4	<b>6.51E-04</b>	1.19		
3825.10213 -10	5	3	3	4	2	2		<b>1.56E-02</b>	2	<b>6.14E-03</b>	1.19	4022.8977	51	10	4	6	93		7	<b>4.10E-04</b>	10	<b>6.62E-04</b>	1.13		
3825.80111 -18	9	2	8	8	1	7		<b>2.09E-04</b>	10	<b>2.13E-03</b>	1.14	4024.3439	0	11	66	10	5	5		<b>2.16E-04</b>	8	<b>5.76E-04</b>	1.06		
3836.82885 -6	6	3	4	5	2	3		<b>1.78E-02</b>	2	<b>7.95E-03</b>	1.16	4025.9305	-6	9	3	6	8	2	7	<b>1.40E-03</b>	3	<b>1.71E-03</b>	1.13		
3839.08223 -1	<b>4</b>	<b>4</b>	<b>1</b>	3	3	0		<b>4.42E-02</b>	3	<b>5.91E-02</b>	1.05	4028.9084	53	8	2	6	7	1	7	<b>3.90E-04</b>	8	<b>3.30E-04</b>	1.08		
3839.2177 13	4	4	0	3	3	1		<b>1.02E-02</b>	2	<b>1.98E-02</b>	1.06	4031.0333	0	11	5	6									

**Table 7 continued**

observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c) % <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c) % <sup>a</sup> R				
3558.93537	-4	7	1	6	8	1	7	<b>1.45E-01</b>	2	<b>0.6</b>	<b>1.08</b>	3667.15533	0	4	0	4	4	2	3	<b>2.98E-01</b>	3	-6.8	1.10		
3559.69107	0	7	2	6	8	2	7	<b>4.06E-01</b>	2	<b>-2.9</b>	<b>1.08</b>	3667.40323	6	2	2	0	3	2	1	<b>2.33E-00</b>	2	3.2	1.15		
3560.7750	7	8	0	8	9	0	9	<b>4.53E-01</b>	5	9.4	1.17	3668.47145	2	2	1	1	3	1	2	<b>4.54E-00</b>	3	4.8	1.16		
3560.7895	59	8	1	8	9	1	9	<b>1.51E-01</b>	5	9.5	1.17	3669.74927	0	5	1	5	5	1	4	<b>2.47E-01</b>	2	<b>2.76E-01</b>	1.15		
3560.89932	-6	6	2	4	7	2	5	<b>6.57E-01</b>	3	3.3	1.11	3671.95675	-1	2	2	1	3	2	2	<b>7.54E-01</b>	2	-0.1	1.12		
3561.45429	1	5	1	5	5	3	2	<b>1.42E-02</b>	3	<b>1.21E-02</b>	1.16	3677.51116	-4	3	0	3	3	2	2	<b>1.00E-01</b>	3	-2.8	1.14		
3563.91431	8	6	3	4	7	3	5	<b>1.17E-01</b>	5	<b>1.52E-01</b>	<b>1.09</b>	3677.5792	-10	9	8	2	9	8	1	<b>3.07E-03</b>	10	<b>2.70E-03</b>	1.21		
3572.6549	-44	4	2	2	4	4	1	<b>4.17E-03</b>	3	7.65E-03	1.05	3679.99097	0	8	8	0	8	8	1	<b>9.60E-03</b>	4	6.1	1.17		
3572.91225	0	5	5	0	6	5	1	<b>3.15E-02</b>	3	-3.6	1.13	3680.1610	-3	1	0	4	7	1	0	<b>9.70E-04</b>	10	8.0	1.25		
3573.8076	49	9	0	9	9	2	8	4.1 OE-03	5	<b>4.66E-03</b>	1.11	3680.97645	-2	2	0	2	3	0	3	<b>5.76E-00</b>	3	5.3	1.16		
3573.9030	90	1	0	1	9	1	0	<b>3.70E-03</b>	4	-7.1	1.15	3682.9748	39	8	3	6	8	3	5	<b>9.15E-03</b>	2	<b>1.06E-02</b>	1.13		
3580.13998	2	5	3	2	6	3	3	<b>1.55E-01</b>	2	<b>2.59E-01</b>	1.12	3683.36880	-2	2	0	2	2	1	1	<b>1.55E-01</b>	2	-0.5	1.16		
3580.31621	1	6	2	5	7	2	6	<b>2.37E-01</b>	2	<b>2.76E-01</b>	1.09	3683.81390	-2	2	1	2	3	1	3	<b>1.66E-00</b>	2	3.1	<b>1.14</b>		
3580.52545	-14	5	4	1	6	4	2	1.1 OE-01	3	-4.4	1.12	3686.37168	-8	6	2	5	6	2	4	<b>4.40E-02</b>	3	<b>6.40E-02</b>	1.14		
3581.33120	2	5	4	2	6	4	3	<b>3.30E-01</b>	3	-4.4	1.12	3687.8232	46	5	1	5	4	3	2	<b>3.00E-03</b>	10	<b>3.89E-03</b>	1.07		
3581.50920	1	7	0	7	8	0	8	<b>3.03E-01</b>	3	7.5	1.15	3690.0807	0	9	7	3	9	7	2	<b>4.88E-03</b>	3	<b>4.20E-03</b>	1.20		
3581.54949	8	7	1	7	8	1	8	<b>8.90E-01</b>	2	5.4	1.14	3690.095	269	9	7	2	9	7	3	<b>1.63E-03</b>	3	<b>1.40E-03</b>	1.20		
3582.081	97	1	0	2	9	1	0	<b>2.84E-04</b>	10	<b>1.35E-03</b>		3692.4142	-106	8	7	1	8	7	2	<b>2.12E-02</b>	4	<b>1.88E-02</b>	1.21		
3585.71122	-2	5	2	3	6	2	4	4.1 OE-01	2	-0.7	1.0\$	3694.14871	-9	4	1	4	4	1	3	<b>2.03E-01</b>	3	<b>1.69E-01</b>	1.13		
3592.6803	-28	9	2	7	9	4	6	<b>1.63E-03</b>	5	-5.1	1.16	3694.23163	0	1	1	0	2	1	1	<b>1.17E-00</b>	3	1.6	1.14		
3593.5W2	-24	9	1	8	9	3	7	3.46E-03	3	-5.6	<b>1.16</b>	*3694.53016	-1	<b>7</b>	<b>7</b>	<b>1</b>	7	7	0	<b>5.75E-02</b>	4	1.9	1.13		
3594.6340	39	7	2	5	7	4	4	<b>4.17E-03</b>	2	<b>5.03E-03</b>	1.11	<b>3699.1153</b>	0	9	4	6	9	4	5	<b>1.08E-02</b>	2	-2.1	1.14		
3595.22505	3	8	0	8	8	2	7	<b>2.86E-02</b>	2	<b>3.33E-02</b>	1.07	<b>3699.7558</b>	8	1	0	6	4	1	0	6	5	<b>2.45E-03</b>	5	<b>1.97E-03</b>	1.24
3596.4919	23	8	2	6	8	4	5	8.70E-03	3	<b>1.01E-02</b>	1.0\$	3701.3400	48	9	6	4	9	6	3	<b>7.75E-03</b>	3	3.8	1.06		
3597.83050	12	8	1	8	8	1	7	<b>9.69E-03</b>	2	<b>1.11E-02</b>	<b>1.08</b>	3703.41972	1	7	3	5	7	3	4	<b>8.11E-02</b>	3	<b>1.02E-01</b>	1.13		
35W .69898	9	5	1	4	6	1	5	<b>5.50E-01</b>	3	0.9	1.09	3703.73926	13	8	6	3	8	6	2	<b>8.95E-03</b>	2	6.8	1.12		
3601.98126	-7	6	0	6	7	0	7	<b>1.60E-00</b>	3	2.9	1.11	3703.82060	-49	8	6	2	8	6	3	<b>2.75E-02</b>	2	9.4	1.15		
3602.09033	-1	6	1	6	7	1	7	<b>5.25E-01</b>	3	<b>1.6</b>	<b>1.10</b>	3704.67505	0	1	1	1	2	1	2	<b>3.71E-00</b>	2	2.6	1.14		
3603.85764	-24	3	1	3	3	3	0	<b>9.01E-03</b>	2	<b>1.38E-02</b>	<b>1.11</b>	3705.8490	10	7	6	2	7	6	1	8.32E-02	10	9.7	1.18		
3605.65730	-4	5	2	4	6	2	5	<b>1.20E-00</b>	3	<b>1.44E-00</b>	1.0\$	3705.8622	25	7	6	1	7	6	2	<b>2.78E-02</b>	10	10.0	1.18		
3606.07833	2	2	0	2	3	2	1	<b>1.47E-01</b>	3	0.6	<b>1.17</b>	*3707.72703	-8	6	6	0	6	6	1	<b>2.80E-01</b>	3	2.0	1.12		
3607.20474	-2	4	4	0	5	4	1	<b>3.67E-01</b>	2	<b>0.4</b>	1.15	3709.02822	-6	9	5	5	9	5	4	<b>1.12E-02</b>	2	4.6	1.10		
3607.40711	1	4	4	1	5	4	2	<b>1.20E-01</b>	2	-1.5	1.13	3711.4733	2	5	2	4	5	2	3	<b>5.00E-01</b>	5	6.0	1.09		
3607.90745	5	9	2	8	9	2	7	<b>1.05E-02</b>	2	-8.6	1.10	3712.32674	-7	8	4	5	8	4	4	<b>1.38E-02</b>	4	2.1	1.17		
3610.61127	0	<b>4</b>	<b>3</b>	<b>1</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>9.64E-01</b>	3	1.1	OE-00	1.17	3713.0360	30	8	5	4	8	5	3	<b>1.24E-02</b>	6	<b>1.23E-02</b>	1.07	
3611.15050	8	8	1	7	8	3	6	2.44E-02	2	<b>-8.2</b>	1.11	3714.51557	2	3	1	3	3	1	2	<b>1.01E-00</b>	3	6.8	1.15		
3612.07096	3	4	2	2	5	2	3	2.04E-00	2	<b>1.1</b>	1.11	3714.7122	-1	9	5	4	9	5	5	3.78E-03	3	7.8	1.13		
3614.1538	6	4	3	2	5	3	3	<b>3.32E-01</b>	4	-9.4	1.16	3714.88985	1	8	5	3	8	5	4	3.85E-02	3	3.68E-02	1.11		
3615.8914	0	7	0	7	7	2	6	2.22E-02	2	-7.2	<b>1.14</b>	3715.70508	-9	7	5	3	7	5	2	<b>1.20E-01</b>	2	5.9	1.14		
3620.94340	9	4	1	3	5	1	4	<b>2.72E-00</b>	2	1.2	1.11	3716.18034	8	7	5	2	7	5	3	<b>3.88E-02</b>	3	<b>3.77E-02</b>	1.11		
3621.15423	-6	7	1	7	7	1	6	<b>6.68E-02</b>	2	-8.4	1.12	3716.8771	43	1	0	5	5	1	0	5	6	2.60E-03	5	-0.7	1.04
3622.14503	3	5	0	5	6	0	6	<b>8.55E-01</b>	3	0.1	1.09	3717.72466	9	6	5	2	6	5	1	9.70E-02	4	-6.2	1.02		
3622.38371	0	5	1	5	6	1	6	<b>2.58E-00</b>	2	<b>1.5</b>	<b>1.12</b>	*3719.4000	222	5	5	1	5	5	0	<b>1.05E-00</b>	5	<b>2.7</b>	<b>1.14</b>		
3626.51568	-1	4	2	3	5	2	4	<b>7.40E-01</b>	3	<b>2.6</b>	<b>1.16</b>	3720.45388	-9	7	4	4	7	4	3	<b>1.27E-01</b>	2	<b>-2.9</b>	<b>1.10</b>		
3629.354	286	1	0	3	8	1	0	3	7	8.1 OE-04	10	<b>9.21E-04</b>	1.04	3724.54456	0	0	0	0	1	0	1	<b>3.27E-00</b>	2	5.3	1.17
3635.0061	-9	8	2	7	8	2	6	8.62E-03	4	<b>1.01E-02</b>	1.03	3725.03003	0	6	4	3	6	4	2	<b>1.25E-01</b>	2	<b>1.1</b>	1.14		
3635.15025	5	6	1	5	6	3	4	<b>8.45E-02</b>	4	-4.1	1.16	3726.56540	18	4	2	3	4	2	2	<b>3.99E-01</b>	5	<b>5.0</b>	1.11		
3635.3126	-24	6	0	6	6	2	5	<b>1.30E-01</b>	3	-6.3	1.14	3727.50755	6	6	4	2	6	4	3	<b>3.66E-01</b>	4	-0.6	1.12		
3636.43000	23	1	0	1	2	2	0	<b>2.90E-02</b>	3	-1.1	1.15	3727.63886	-2	5	4	2	5	4	1	<b>9.66E-01</b>	4	3.4	1.15		
3639.51600	-4	5	1	4	5	3	3	<b>3.23E-02</b>	2	-5.8	1.15	3728.17812	1	<b>5</b>	<b>4</b>	<b>1</b>	5	4	2	<b>3.23E-01</b>	4	3.9	<b>1.16</b>		
3639.57711	-1	3	2	1	4	2	2	<b>9.05E-01</b>	2	4.6	<b>1.16</b>	3728.46770	-4	5	3	3	5	3	2	<b>6.53E-01</b>	3	<b>6.53E-01</b>	1.13		
<b>3640.14525</b>	<b>5</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1.12E-00</b>	<b>3</b>	<b>6.9</b>	<b>1.21</b>	3728.49445	-5	7	4	3	7	4	4	<b>4.19E-02</b>	2	-1.9	1.13		
3641.93325	-1																								

Table 7 continued

observed position	o-c	upper J K <sub>a</sub>	lower J K <sub>a</sub>	observed strength %s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J K <sub>a</sub>	lower J K <sub>a</sub>	observed strength %s	(o-c)% <sup>a</sup> R
3737.18332	<b>-5</b>	3 3 1	3 3 0	<b>4.52E-00</b>	3 6.5 1.18	3859.7695	51	8 4 5	8 2 6	<b>1.86E-03</b>	5 2.1 OE-03 1.03
3737.63330	0	3 3 0	3 3 1	1.40E-00	5 -1.0 1.09	3861.37207	2	6 1 6	5 1 5	<b>1.14E-00</b>	3 -0.4 1.13
3737.94707	0	5 3 2	5 3 3	<b>1.53E-01</b>	4 <b>2.68E-01</b> 1.14	3862.2611	-13	6 0 6	5 0 5	3.45E-00	5 0.0 1.13
37.40.2368	-2	9 4 5	9 4 6	2.20E-03	10 3.36E-03 1.09	3864.21779	-7	6 5 2	5 5 1	<b>4.39E-02</b>	2 3.4 1.21
3741.1288	2	6 0 6	5 2 3	7.80E-03	3 <b>1.08E-02</b> 1.09	3864.26428	0	6 5 1	5 5 0	<b>1.28E-01</b>	3 0.5 1.17
3741.71545	0	1 1 1	1 1 0	4.29E-00	2 3.1 1.15	3866.56523	6	5 1 4	4 1 3	<b>1.15E-00</b>	3 3.6 1.14
3742.00742	2	2 2 1	2 2 0	<b>1.90E-00</b>	2 1.4 1.12	<b>3867.37264</b>	7	7 4 4	7 2 5	<b>8.40E-03</b>	3 -7.7 1.13
3742.3012	-13	2 2 0	3 0 3	1.64E-02	2 -4.0 1.14	3872.4408	-10	8 1 7	8 1 8	3.21E-02	2 2.83E-02 1.11
3747.5620	16	3 0 3	2 2 0	<b>1.38E-02</b>	4 -1.6 1.17	3872.59353	-2	5 2 3	4 2 2	<b>8.41E-01</b>	4 1.8 1.13
3752.7858	7	5 0 5	4 2 2	7.62E-03	2 9.31E-03 1.10	3872.68242	-13	6 4 3	5 4 2	<b>1.45E-01</b>	3 -3.1 1.12
3755.1587	23	4 0 4	3 2 1	<b>4.79E-02</b>	3 -6.2 1.17	3873.20445	-9	6 2 5	5 2 4	<b>5.70E-01</b>	2 6.36E-01 1.10
3758.42541	-4	4 2 2	4 2 3	<b>1.23E-00</b>	4 1.09E-00 1.18	3873.81518	-1	6 4 2	5 4 1	<b>4.50E-01</b>	3 0.9 1.17
3759.5196	-13	5 1 4	4 3 1	<b>7.37E-03</b>	4 <b>8.48E-03</b> 1.14	3874.10341	-17	8 2 7	8 0 8	<b>1.04E-02</b>	3 9.28E-03 1.15
3762.35410	-8	2 1 1	2 1 2	<b>1.98E-00</b>	2 9.4 1.19	3875.2795	<b>-13</b>	1 0 3 8	1 0 1 9	1.20E-03	2 <b>1.01E-03</b> 1.17
3763.09489	0	7 3 4	7 3 5	<b>3.90E-02</b>	2 <b>3.14E-02</b> 1.16	3876.34528	-2	6 3 4	5 3 3	2.95E-01	3 <b>3.43E-01</b> 1.12
3764.4628	-53	7 2 5	6 4 2	<b>1.43E-03</b>	2 <b>1.77E-03</b> 1.21	3876.9038	187	7 6 2	6 6 1	<b>3.60E-02</b>	3 -2.4 1.18
3767.6008	-10	1 0 4 6	1 0 4 7	2.85E-03	4 2.35E-03 1.16	3877.79530	0	7 1 7	6 1 6	<b>2.20E-00</b>	2 -0.2 1.13
3771.86095	0	1 0 1	0 0 0	<b>1.12E-00</b>	3 3.2 1.15	3878.18853	-1	7 0 7	6 0 6	<b>7.15E-01</b>	2 -2.8 1.10
3772.54413	<b>11</b>	5 2 3	5 2 4	1.72E-01	3 <b>1.48E-01</b> 1.17	3879.2933	75	3 3 0	3 1 3	2.70E-03	5 <b>2.82E-03</b> 1.26
3775.0478	-21	6 1 5	5 3 2	2.22E-02	2 <b>2.61E-02</b> 1.15	3883.34302	2	6 1 5	5 1 4	2.23E-00	3 5.4 1.16
3777.09913	0	3 1 2	3 1 3	<b>3.32E-01</b>	3 <b>8.9 1.16</b>	3884.65095	1	3 2 1	2 0 2	7.50E-02	6 <b>7.09E-02</b> 1.14
3779.4693	-29	8 3 5	8 3 6	4.01E-02	3 <b>2.83E-02</b> <b>1.26</b>	3886.88269	1	7 5 3	6 5 2	<b>1.12E-01</b>	4 -0.2 1.17
3787.6841	27	8 2 6	7 4 3	<b>3.12E-03</b>	3 <b>4.42E-03</b> 1.07	3887.12045	-2	7 5 2	6 5 1	3.70E-02	3 -1.0 1.16
3788.78517	-5	2 1 2	1 1 1	<b>1.40E-00</b>	5 5.2 1.19	3888.7585	-52	1 1 3 9 1 1 1 1 0	1 1 0	1.10E-03	10 9.75E-04 1.08
3790.66726	-1	6 2 4	6 2 5	<b>2.12E-01</b>	2 <b>1.76E-01</b> 1.18	3889.0212	-5	9 1 8	9 1 9	<b>4.11E-03</b>	4 <b>3.86E-03</b> 1.08
3793.74059	1	2 0 2	1 0 1	5.76E-00	3 4.7 1.17	3889.2435	66	5 4 2	5 2 3	<b>7.17E-03</b>	2 8.39E-03 1.19
3795.5184	-8	4 1 3	4 1 4	5.10E-01	3 6.2 1.11	3889.7684	5	9 2 8	9 0 9	<b>1.27E-02</b>	4 <b>1.15E-02</b> 1.12
3799.39465	7	2 1 1	1 1 0	<b>3.93E-00</b>	3 4.1 1.16	3891.73358	-2	7 2 6	6 2 5	<b>1.14E-00</b>	3 -0.7 1.12
3808.39833	3	3 1 3	2 1 2	5.85E-00	3 4.3 1.18	3892.09085	0	6 3 3	5 3 2	<b>7.00E-01</b>	5 <b>9.88E-01</b> 1.12
3811.78007	-2	3 2 2	3 0 3	<b>2.85E-01</b>	2 <b>2.56E-01</b> 1.20	3893.4814	-3	<b>4 3 1</b>	4 1 4	<b>7.41E-03</b>	3 <b>1.03E-02</b> 1.24
3814.17245	<b>1</b>	3 2 2	2 2 1	<b>2.56E-00</b>	3 -1.7 1.15	3893.76723	-24	8 1 8	7 1 7	4.10E-01	2 -2.8 1.11
3815.81545	-4	5 1 4	5 1 5	9.70E-02	2 <b>8.47E-02</b> 1.18	3893.93598	-6	8 0 8	7 0 7	<b>1.25E-00</b>	3 -1.2 1.12
3819.22443	0	3 2 1	2 2 0	<b>8.35E-01</b>	2 -2.1 1.12	3895.04478	4	7 4 4	6 4 3	<b>2.95E-01</b>	3 -1.3 1.18
3820.02279	-11	4 2 3	4 0 4	<b>9.68E-02</b>	2 6.9 1.16	3896.48315	-6	6 2 4	5 2 3	<b>1.65E-00</b>	2 <b>4.0 1.13</b>
3820.891	12	1 0 3 7	1 0 3 8	<b>3.00E-03</b>	10 2.25E-03 1.13	3897.21238	0	7 3 5	6 3 4	<b>5.48E-01</b>	2 <b>6.22E-01</b> 1.10
3824.03101	1	3 1 2	2 1 1	<b>1.71E-00</b>	3 3.8 1.16	3898.03765	4	7 1 6	6 1 5	<b>3.95E-01</b>	3 -1.6 1.08
3827.37698	4	4 1 4	3 1 3	<b>1.76E-00</b>	3 -6.6 1.15	3898.3243	3	7 4 3	6 4 2	9.69E-02	2 -1.2 1.17
3830.05664	1	4 0 4	3 0 3	<b>6.12E-00</b>	3 <b>4.1 1.17</b>	<b>3899.1064</b>	-27	8 6 3	7 6 2	<b>7.06E-03</b>	2 -2.7 1.18
3832.32782	3	8 2 6	8 2 7	<b>3.16E-02</b>	2 <b>2.60E-02</b> <b>1.15</b>	<b>3899.1504</b>	-38	8 6 2	7 6 1	<b>2.16E-02</b>	2 -0.8 1.21
3832.6059	17	5 2 4	5 0 5	<b>1.85E-01</b>	2 -7.7 1.18	3905.4231	75	1 0 2 9 1 0 0 1 0	1 0 0	<b>1.05E-03</b>	5 <b>1.45E-03</b> 1.15
3832.77194	<b>18</b>	4 3 2	3 3 1	<b>3.99E-01</b>	2 -4.6 1.11	3908.48592	13	8 2 7	7 2 6	<b>2.05E-01</b>	3 1.0 1.12
3834.01784	-6	4 3 1	3 3 0	1.22E-00	2 -2.2 1.16	3909.2723	-44	8 5 4	7 5 3	<b>2.22E-02</b>	3 -0.1 1.18
3835.97741	-3	6 1 5	6 1 6	<b>1.50E-01</b>	3 <b>1.31E-01</b> 1.17	3909.35754	0	9 1 9	8 1 8	<b>6.35E-01</b>	4 -2.7 1.11
3836.16185	-4	4 2 3	3 2 2	<b>1.03E-00</b>	2 -3.3 1.17	3909.42886	0	9 0 9	8 0 8	<b>2.19E-01</b>	3 0.6 1.15
3836.52811	-4	6 3 4	6 1 5	<b>1.87E-02</b>	2 <b>2.18E-02</b> <b>1.14</b>	3909.8744	-23	9 7 3	8 7 2	4.10E-03	10 -7.3 1.18
3836.76272	-1	5 3 3	<b>5 1 4</b>	<b>6.50E-02</b>	5 7.35E-02 1.18	3910.13321	-2	8 5 3	7 5 2	<b>6.31E-02</b>	3 -5.0 1.12
3841.20283	-4	4 3 2	4 1 3	<b>1.70E-02</b>	2 -7.6 1.16	3912.0457	-8	8 1 7	7 1 6	<b>6.22E-01</b>	2 0.0 1.10
3841.39882	21	7 3 5	7 1 6	3.75E-02	2 <b>4.15E-02</b> 1.10	3915.1635	26	4 4 0	4 2 3	2.64E-03	4 3.58E-03 1.24
3842.6134	6	6 2 5	6 0 6	3.77E-02	4 -4.8 <b>1.14</b>	3916.62347	5	8 4 5	7 4 4	<b>5.19E-02</b>	2 -2.1 1.16
3844.3245	<b>6</b>	5 1 5	4 1 4	<b>5.00E-00</b>	3 5.7 1.20	3917.0206	-20	8 3 6	7 3 5	<b>1.00E-01</b>	5 -6.0 1.10
3846.24339	-2	5 0 5	<b>4 0 4</b>	<b>1.69E-00</b>	3 5.7 1.19	3917.3141	-24	7 2 5	6 2 4	<b>2.90E-01</b>	10 2.7 1.10
<b>3846.42868</b>	9	4 2 2	3 2 1	<b>3.20E-00</b>	3 <b>4.7</b> 1.18	3917.7180	-85	7 3 4	6 3 3	<b>1.85E-01</b>	4 -3.0 1.14
3846.71275	<b>13</b>	<b>4 1 3 3 1 2</b>	<b>4.81E-00</b>	2 6.6 1.18	3920.2097	32	<b>5 4 1</b>	5 2 4	<b>1.27E-03</b>	10 <b>1.76E-03</b> 1.26	
3847.8411	6	3 3 1	3 1 2	<b>2.39E-02</b>	3 3.1 1.20	3920.3869	-16	1 1 2 1 0 1 1 0 1 1	1 1 1	<b>1.89E-03</b>	3 <b>1.49E-03</b> 1.29
3849.82722	-3	5 4 2	<b>4 4 1</b>	<b>4.63E-01</b>	3 1.4 1.15	3921.03359	-15	9 6 4	8 6 3	<b>1.18E-02</b>	3 <b>1.15E-02</b> 1.24
3850.10054	-2	<b>5 4 1</b>	4 4 0	<b>1.56E-01</b>	2 2.7 1.16	3921.21835	-7	9 6 3	8 6 2	4.10E-03	3 6.7 1.30
3850.53245	-7	8 3 6	8 1 7	<b>7.21E-03</b>	5 5.4 1.09	3921.32668	-7	4 2 2	3 0 3	<b>2.00E-01</b>	2 <b>1.86E-01</b> 1.16
3854.83625	5	5 3 3	4 3 2	<b>1.25E-00</b>	3 -9.1 1.16	3923.76234	-4	8 4 4	7 4 3	<b>1.44E-01</b>	3 -6.1 <b>1.17</b>
3854.8720	-50	<b>7 1 6 7 1 7</b>	<b>2.50E-02</b>	10 <b>2.11E-02</b> 1.20	3924.21842	-2	9 2 8	8 2 7	<b>2.92E-01</b>	3 1.2 1.12	
3855.0654	-4	2 2 0	<b>1 0 1</b>	<b>1.14E-01</b>	3 <b>1.07E-01</b> 1.14	3924.5916	-19	1 0 1 1 0 9 1 9	1 0 0	<b>1.00E-01</b>	3 <b>-1.4</b> 1.12
3857.95078	2	5 3 2	4 3 1	<b>3.06E-01</b>	3 <b>4.49E-01</b> 1.07	3924.62428	<b>5</b>	1 0 0 1 0 9 0 9	1 0 0	<b>2.96E-01</b>	3 -2.7 1.11
3858.40210	1	7 2 6	7 0 7	<b>6.60E-02</b>	3 <b>6.09E-02</b> <b>1.14</b>	3926.06268	-4	9 1 8	8 1 7	9.77E-02	3 0.7 1.11

**Table 7 continued**

observed position	o-c	upper J	K <sub>A</sub>	lower K <sub>C</sub>	observed strength	%s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>A</sub>	lower K <sub>C</sub>	observed strength	%s	(o-c)% <sup>a</sup> R											
3926.2243	-12	3	3	0	2	1	1	<b>1.36E-02</b>	3	1.15	3997.1759	0	1	1	3	8	1	0	3	7	4.1	OE-03	4	4.3	1.05	
3929.6032	-1	6	4	2	6	2	5	<b>2.45E-03</b>	4	4.12	003	1.12	4000.3859	6	6	3	3	5	1	4	6.40E-02	3	<b>9.22E-02</b>	1.17		
3931.21464	6	9	5	5	8	5	4	3.10E-02	2	-1.8	4003.1669	52	4	4	0		3	2	1		<b>1.47E-02</b>	4	-8.8	1.13		
3931.24400	0	1	0	7	3	9	7	<b>1.35E-03</b>	7	<b>1.56E-03</b>	1.10	4006.2929	0	13	4	10	1	2	4	9	7.50E-04	10	-2.5	1.03		
3933.6463	-30	9	5	4	8	5	3	<b>1.00E-02</b>	2	-3.9	4007.7027	0	1	1	4	7	1	0	4	6	<b>2.60E-03</b>	10	1.7	1.07		
3934.60240	-3	8	2	6	7	2	5	<b>4.02E-01</b>	3	3.0	4008.0670	0	1	2	5	7	1	1	5	6	<b>9.60E-04</b>	10	<b>1.16E-03</b>	1.10		
3935.28875	-13	9	3	7	8	3	6	<b>1.43E-01</b>	3	0.0	4008.5360	0	1	2	3	9	1	1	3	8	3.75E-03	3	<b>3.27E-03</b>	1.14		
3937.18297	-15	9	4	6	8	4	5	<b>6.85E-02</b>	3	-3.9	4009.0849	33	4	4	1		3	2	2		<b>4.54E-03</b>	4	<b>5.12E-03</b>	1.12		
3939.4268	-22	1	0	2	9	9	2	<b>2.59E-02</b>	2	4.1	OE-02	1.07	4011.3379	0	5	3	3	<b>4</b>	<b>1</b>	<b>4</b>	<b>2.95E-02</b>	3	<b>3.40E-02</b>	1.10		
3939.4868	0	11	1	11	10	1	10	<b>1.25E-01</b>	3	-2.7	4017.61577	11	6	2	4		5	0	5		<b>4.65E-02</b>	3	6.4	1.16		
3939.5008	0	1	1	0	1	1	0	<b>4.18E-02</b>	3	-2.4	4020.2592	29	5	4	1		4	2	2		<b>8.90E-03</b>	4	-0.5	1.15		
3940.14202	-16	1	0	1	9	9	1	<b>1.26E-01</b>	3	2.0	4026.5780	0	1	2	4	8	1	1	4	7	<b>2.14E-03</b>	3	3.3	1.00		
3941.72380	1	3	3	1	2	1	2	<b>2.54E-02</b>	2	3.6	4035.41910	-5	6	4	2		5	2	3		<b>3.16E-02</b>	3	3.8	1.12		
3942.38600	-5	8	3	5	7	3	4	<b>2.67E-01</b>	3	-2.5	4035.59740	4	5	4	2		4	2	3		<b>2.15E-02</b>	2	-6.4	1.14		
3943.2437	-42	1	0	6	4	9	6	<b>4.97E-03</b>	2	2.4	4035.7085	-31	7	3	4		6	1	5		<b>1.44E-02</b>	3	<b>1.62E-02</b>	1.12		
3944.67539	-18	<b>4</b>	<b>3</b>	<b>1</b>	3	1	2	8.30E-02	4	-4.7	4051.1753	2	7	4	3		6	2	4		<b>9.44E-03</b>	4	5.4	1.08		
3948.67415	4	9	2	7	8	2	6	<b>5.65E-02</b>	2	5.6	4052.64464	-15	6	3	4		5	1			<b>7.00E-03</b>	4	<b>7.87E-03</b>	1.10		
3948.7878	-37	9	4	5	8	4	4	<b>1.70E-02</b>	2	<b>2.21E-02</b>	1.15	4064.7140	18	6	4	3		5	2	4		<b>7.12E-03</b>	2	-1.7	1.15	
3951.94558	8	1	0	3	8	9	3	<b>1.92E-02</b>	3	1.7	4070.6809	-8	8	4	4		7	2	5		<b>2.00E-02</b>	3	11.4	1.09		
3953.0208	52	6	3	3	6	1	6	<b>1.22E-03</b>	4	<b>2.20E-03</b>	1.15	4073.55587	-5	7	2	5		6	0	6		<b>6.25E-03</b>	2	2.4	1.13	
3953.71015	5	1	1	2	1	0	1	<b>4.70E-02</b>	2	-0.9	4074.8503	<b>14</b>	5	5	0		4	3	1		<b>1.80E-03</b>	10	<b>2.27E-03</b>	1.18		
*3954.0416	<b>168</b>	1	2	0	1	2	1	1	<b>6.55E-02</b>	4	-0.3	<b>1.14</b>	4076.21603	3	5	5	1		4	3	2		<b>5.17E-03</b>	2	<b>6.80E-03</b>	1.14
3954.14803	0	1	1	1	0	1	0	<b>1.65E-02</b>	<b>4</b>	4.2	4080.36526	31	8	3	5		7	1	6		<b>1.84E-02</b>	3	-2.9	1.12		
3954.8170	77	6	5	1	6	3	4	<b>6.60E-04</b>	10	<b>1.34E-03</b>	4094.7142	<b>16</b>	6	5	1		5	3	2		<b>7.91E-03</b>	2	<b>9.18E-03</b>	1.15		
3956.5726	12	1	0	4	7	9	4	<b>8.80E-03</b>	3	-4.4	4096.2303	-5	9	4	5		8	2	6		<b>3.05E-03</b>	5	<b>2.89E-03</b>	1.06		
3960.86377	0	1	0	2	8	9	2	<b>6.33E-02</b>	3	5.1	4097.1404	-6	7	4	4		6	2	5		<b>1.49E-02</b>	2	-2.8	1.10		
3963.7905	0	1	1	6	6	1	0	<b>1.60E-03</b>	4	-7.0	4098.0396	-2	7	3	5		6	1	6		<b>1.34E-02</b>	3	-1.4	1.16		
3964.3224	<b>-11</b>	9	3	6	8	3	5	4.05E-02	3	9.8	1.14	4099.6590	21	6	5	2		5	3	3		<b>2.40E-03</b>	7	<b>3.03E-03</b>	1.08	
3964.99620	0	5	3	2	4	1	3	<b>3.08E-02</b>	3	<b>3.78E-02</b>	1.17	4111.2474	-18	7	5	2		6	3	3		<b>2.57E-03</b>	8	-5.7	1.13	
3965.4659	0	1	1	6	5	1	0	<b>4.96E-04</b>	6	<b>5.69E-04</b>	4123.8884	1	7	5	3		6	3	4		<b>6.71E-03</b>	3	<b>7.92E-03</b>	1.07		
3966.05115	<b>-8</b>	5	2	3	4	0	4	<b>3.54E-02</b>	3	6.3	1.16	4124.5238	<b>14</b>	8	5	3		7	3	4		<b>5.55E-03</b>	2	-4.6	1.03	
3967.23550	0	11	3	9	10	3	8	<b>2.05E-02</b>	4	<b>1.8</b>	1.10	4131.0392	39	8	2	6		7	0	7		<b>7.75E-03</b>	3	-0.7	1.12	
3967.7508	0	12	2	11	11	2	10	5.60E-03	4	<b>5.53E-03</b>	1.12	4131.8798	-82	9	3	6		8	1	7		<b>2.00E-03</b>	10	-6.8	1.05	
3967.9602	10	12	1	11	11	1	10	<b>1.67E-02</b>	2	<b>0.6</b>	4133.2492	61	8	4	5		7	2	6		<b>2.98E-03</b>	3	3.2	1.14		
*3968.2468	56	13	1	3	13	12	1	<b>2.21E-02</b>	3	<b>-3.5</b>	4136.2809	29	9	5	4		8	3	5		<b>1.23E-03</b>	2	5.4	1.04		
3972.5737	-25	11	2	9	10	2	8	<b>7.50E-03</b>	5	6.93E-03	1.15	4139.0939	-120	6	6	0		<b>5</b>	<b>4</b>	<b>1</b>		<b>1.30E-03</b>	8	<b>2.50E-03</b>	0.96	
3972.7178	-29	11	5	7	10	5	6	<b>4.00E-03</b>	5	-6.5	1.10	4145.3257	-60	1	0	4	6	9	2	7		<b>1.30E-03</b>	6	3.09E-03	1.07	
3974.6417	-23	11	4	8	104	7		9.20E-03	3	-2.0	1.10	4146.4698	19	8	3	6		7	1	7		<b>2.20E-03</b>	3	-4.4	1.09	
3981.4034	0	13	2	12	12	2	11	<b>5.65E-03</b>	4	7.0	1.18	4149.4577	-7	1	0	5	5	9	3	6		<b>1.97E-03</b>	4	<b>1.77E-03</b>	1.01	
3982.1763	0	1	4	1	1	4	1	<b>1.70E-03</b>	5	-7.1	1.08	<b>4149.716</b>	-lo	8	5	4		7	3	5		<b>1.62E-03</b>	4	-8.2	1.08	
3982.2275	0	1	4	0	1	4	1	<b>5.26E-03</b>	<b>4</b>	-3.5	1.12	4161.1%	-122	7	6	2		6	4	3		<b>1.77E-03</b>	5	<b>2.92E-03</b>	0.98	
3982.66343	-7	1	0	3	7	9	3	<b>4.15E-02</b>	3	<b>7.9</b>	1.10	4173.0193	<b>6</b>	9	4	6		8	2	7		<b>4.14E-03</b>	3	0.7	1.09	
3983.2770	0	11	5	6	10	5	5	<b>1.17E-03</b>	10	<b>1.35E-03</b>	1.05	4177.9325	<b>56</b>	9	5	5		8	3	6		2.55E-03	10	<b>2.86E-03</b>	0.99	
3984.4469	5	1	2	2	1	0	1	<b>6.70E-03</b>	7	<b>6.57E-03</b>	1.08	4180.6733	-3	8	6	2		7	4	3		<b>1.54E-03</b>	6	<b>2.24E-03</b>	0.97	
3987.73340	0	1	0	4	6	9	4	<b>1.83E-02</b>	2	<b>2.45E-02</b>	1.10	4184.276	-253	8	6	3		7	4	4		<b>5.81E-04</b>	10	<b>7.50E-04</b>		
3991.223	0	124	9	<b>11</b>	4	8		<b>9.20E-04</b>	5	-2.8	1.06	4187.1303	-66	1	0	3	7	9	1	8		<b>1.90E-03</b>	3	<b>2.11</b>	E-03	1.02
3991.791	0	12	5	8	11	5	7	<b>3.55E-04</b>	10	<b>4.25E-04</b>	1.06	4187.7715	<b>0</b>	9	2	7		8	0	8		<b>1.04E-03</b>	4	-6.3	1.09	
3994.7863	0	1	4	1	1	3	1	<b>1.59E-03</b>	5	4.0	<b>1.14</b>	419.5795	<b>14</b>	9	3	7		8	1	8		<b>3.12E-03</b>	3	-2.0	1.13	
3994.9200	0	13	3	11	12	3	10	<b>1.92E-03</b>	<b>4</b>	1.9	1.08	4206.695	118	9	6	4		8	4	5		9.70E-04	5	<b>1.35E-03</b>	0.93	
*3995.5423	55	15	1	15	<b>14</b>	<b>14</b>		<b>2.00E-03</b>	5	-5.0	1.09	4216.043	135	1	0	4	7	9	2	8		<b>5.40E-04</b>	5	-5.2		
<b>3996.517</b>	<b>0</b>	1	3	<b>2</b>	11	<b>12</b>	<b>2</b>	<b>7.56E-04</b>	<b>15</b>	<b>6.33E-04</b>		4242.7246		1	0	2	8	9	0	9		<b>1.25E-03</b>	10	-10.0	1.09	

• asterisk denotes a doubled absorption with the quantum assignment given for the stronger transition. The strength given represents the sum of the strengths of the two comparable transitions.

o-c are observed minus computed line positions in cm-lx 10<sup>3</sup>. Computed values derived from energy levels given

**Table 8. Line positions (cm<sup>-1</sup>) and strengths (cm<sup>-2</sup>/atm. at 296K) observed in the (001)-(000) band of H<sub>2</sub><sup>18</sup>O.**

observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength %	(o-c)% R	observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength %	(o-c)% R						
3160.6757	-33	8	5	3	9	7	2	<b>1.95E-04</b>	8	9.40E-05	1.04	3435.09458	6	6	1	5	7	3	4	<b>1.66E-02</b>	2	-0.9	1.13		
3185.9079	72	75	3		8		72	<b>3.20E-04</b>	8	<b>1.68E-04</b>	<b>0.9E</b>	3435.4930	<b>-41</b>	7	4	4	7	6	1		6.05E-04	3	<b>3.91E-04</b>	1.00	
3186.1965	34	7	5	2	8	7	1	<b>1.20E-04</b>	10	<b>5.61E-05</b>		3435.91120	18	1	0	5	6	1	1	5	7	<b>8.20E-04</b>	2	-10.5	1.08
3203.0418	<b>7</b>	9	1	9	10	38		2.37E-04	10	5.1	1.0\$	3437.5744	<b>-12</b>	6	4	3	6	6	0		<b>1.73E-04</b>	8	<b>9.92E-05</b>	1.11	
3206.4359	<b>-74</b>	9	4	5	1	0	6	<b>1.38E-04</b>	10	<b>3.85E-05</b>	1.05	3439.0051	-13	6	4	2	6	6	1		<b>5.00E-04</b>	6	2.96E-04	1.05	
3212.4891	-116	6	5	2	7	7	1	<b>1.25E-04</b>	10	6.66E-05	<b>0.9E</b>	3440.075	-82	7	4	3	7	6	2		<b>1.87E-04</b>	10	<b>1.31E-04</b>	0.88	
3212.5430	15	6	5	1	7	7	0	<b>3.88E-04</b>	4	<b>2.00E-04</b>	<b>1.03</b>	3440.4672	-25	9	7	2	1	0	7	3	<b>3.25E-04</b>	7	-2.5	1.09	
3213.2382	38	8	4	5	9	6	4	<b>2.20E-04</b>	8	<b>9.31E-05</b>	<b>1.05</b>	3440.48675	0	9	7	3	1	0	7	4	<b>9.75E-04</b>	7	-2.5	1.10	
3220.6854	31	93	7	10	5	6		4.1	OE-O4	8	<b>2.39E-04</b>	1.1!	3442.2752	0	1	0	4	6	1	1	4	<b>3.50E-03</b>	2	5.1	OE-O3 1.02
3223.4406	-20	6	1	5	7	5	2	<b>2.06E-04</b>	10	<b>1.46E-04</b>	<b>1.07</b>	3443.9115	<b>-14</b>	9	2	8	9	4	5		<b>3.40E-04</b>	4	-5.6	0.99	
3224.3430	-43	8	4	4	9	6	3	<b>7.88E-04</b>	3	<b>2.78E-04</b>	<b>1.06</b>	3443.9708	<b>-51</b>	8	4	4	8	6	3		<b>5.30E-04</b>	6	3.08E-04	1.00	
3224.6604	-94	9	2	8	1	0	4	<b>3.30E-04</b>	5	6	6	1.01	3445.74865	<b>21</b>	4	2	2	<b>5</b>	<b>4</b>	1		8.50E-03	2	<b>1.36E-02</b>	1.10
3240.24030	-1	7	4	4	8	6	3	<b>1.28E-03</b>	4	<b>5.61E-04</b>	1.04	3445.85287	0	1	1	3	9	1	2	3	<b>3.85E-03</b>	2	1.0	1.12	
3244.7822	23	74	3		86	2		<b>4.45E-04</b>	3	<b>1.86E-04</b>	1.02	3447.6802	-29	1	3	1	1	3	1	4	3.63E-03	4	<b>1.8</b>	1.16	
3253.6316	40	6	0	6	7	4	3	<b>3.22E-04</b>	4	<b>2.51E-04</b>	<b>1.0E</b>	3449.08270	2	1	0	4	7	1	1	4	<b>1.74E-03</b>	3	<b>1.97E-03</b>	1.06	
3257.1855	-18	8	3	6	9	5	5	<b>4.30E-04</b>	5	<b>2.16E-04</b>	1.07	3450.560	-51	9	4	5	9	6	4		<b>1.22E-04</b>	5	<b>6.13E-05</b>		
3259.5662	11	8	1	8	9	3	7	<b>2.47E-04</b>	4	9.6	1.13	3451.4652	28	9	6	3	1	0	6	4	1.00E-03	2	-5.3	1.09	
3264.0655	53	9	1	8	103	7		<b>1.26E-04</b>	10	-4.8	1.02	3451.79844	6	9	6	4	1	0	6	5	3.00E-03	2	-5.2	1.09	
3266.5995	-7	6	4	3	7	6	2	7.1	OE-O4	3	<b>2.94E-04</b>	1.13	3453.47455	<b>1</b>	8	8	0	9	8	1		<b>5.40E-04</b>	10	-2.0	1.07
3268.0240	-41	6	4	2	7	6	1	2.05E-03	3	<b>8.81E-04</b>	<b>1.06</b>	3457.8029	-38	9	4	5	1	0	4	6	<b>3.80E-03</b>	4	<b>5.61E-03</b>	1.07	
3273.64236	-42	8	2	7	9	4	6	<b>4.20E-04</b>	7	<b>3.12E-04</b>	<b>1.19</b>	3458.2745	-36	3	2	2	4	4	4	1	<b>2.65E-03</b>	3	9.55E-03	1.08	
3289.8496	10	7	3	5	8	5	4	<b>3.77E-03</b>	2	<b>1.46E-03</b>	1.07	3458.4906	<b>0</b>	9	5	4	1	0	5	5	<b>2.58E-03</b>	3	-5.8	1.11	
3292.76246	-1	5	4	2	6	6	1	<b>2.08E-03</b>	2	<b>9.14E-04</b>	<b>1.08</b>	3459.2804	<b>-6</b>	5	0	5	6	2	4		<b>5.74E-03</b>	3	-2.0	1.10	
3293.07625	<b>14</b>	<b>5</b>	<b>4</b>	<b>1</b>	6	6	0	7.1	OE-O4	3	<b>3.05E-04</b>	1.11	3461.6130	<b>-14</b>	9	3	7	9	5	4		<b>5.80E-04</b>	3	<b>4.59E-04</b>	1.05
3306.5763	<b>4</b>	8	3	5	9	5	4	<b>4.20E-04</b>	3	<b>8.31E-04</b>	1.14	3461.7574	<b>31</b>	9	5	5	1	0	5	6	<b>7.55E-03</b>	2	-8.6	1.08	
3309.9600	<b>69</b>	9	2	7	1	0	4	<b>2.21E-04</b>	10	5.2	1.20	<b>3464.6574</b>	2	6	3	2	1	4	4	0	<b>1.79E-03</b>	3	<b>3.33E-03</b>	1.23	
3314.4620	<b>-1</b>	7	1	7		836		<b>2.00E-03</b>	4	7.7	1.0\$	<b>3466.6315</b>	169	<b>8</b>	<b>7</b>	<b>1</b>	9	7	2		<b>3.00E-03</b>	3	3.1	1.14	
3318.6902	-20	7	2	6	8	4	5	3.45E-03	3	<b>2.44E-03</b>	<b>1.07</b>	3467.2883	-3	1	0	2	8	1	1	2	<b>1.31E-02</b>	2	0.0	1.09	
3319.6911	-15	6	3	4	7	5	3	<b>2.80E-03</b>	3	<b>8.83E-04</b>	1.04	3467.533	-163	1	1	1	0	1	2	1	<b>3.25E-03</b>	3	3.2	1.15	
3326.8121	-7	8	1	7		936		<b>1.48E-03</b>	4	-2.1	1.02	3467.546	-10	1	1	2	1	0	2	2	<b>4.03E-03</b>	3	<b>3.3</b>	<b>1.15</b>	
3335.81866	11	70	7		82	6		<b>6.68E-04</b>	3	-4.5	1.02	3467.9309	-4	1	0	3	8	1	1	3	<b>4.03E-03</b>	3	<b>-3.0</b>	<b>1.09</b>	
3340.4494	-37	6	3	3	7	5	2	<b>9.50E-04</b>	3	2.75E-03	1.02	3469.4492	89	1	2	0	1	2	1	3	<b>1.22E-02</b>	2	2.6	1.16	
3347.76200	-3	5	3	3	6	5	2	<b>1.38E-02</b>	2	<b>3.69E-03</b>	1.08	3470.3512	-41	9	3	6	1	0	3	7	<b>9.45E-03</b>	5	7.3	1.16	
3352.69780	28	5	3	2	6	5	1	<b>7.50E-03</b>	7	<b>1.24E-03</b>	1.19	3472.96498	-6	9	4	6	1	0	4	7	<b>1.63E-02</b>	2	<b>1.82E-02</b>	1.10	
3354.6698	<b>-71</b>	4	0	4	<b>5</b>	<b>4</b>	1	<b>6.95E-04</b>	3	<b>5.04E-04</b>	1.03	3475.80390	<b>4</b>	5	1	4	6	3	3	<b>1.26E-02</b>	2	-0.4	1.13		
3358.9514	-12	6	2	5	7	4	4	3.80E-03	3	<b>1.76E-03</b>	1.07	<b>3475.9985</b>	<b>61</b>	8	3	6	8	5	3		<b>4.88E-04</b>	3	<b>3.48E-04</b>	1.01	
3366.8890	-18	6	1	6		735		<b>1.72E-03</b>	3	<b>1.52E-03</b>	1.09	3476.6185	<b>17</b>	<b>7</b>	<b>1</b>	<b>7</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>1.11E-03</b>	6	-2.7	1.05		
3371.2314	10	12	5	7	13	58		<b>1.43E-04</b>	10	<b>1.80E-04</b>	1.11	3478.01534	27	8	6	2	9	6	3		<b>7.35E-03</b>	3	-5.1	1.07	
3374.74580	-40	4	3	2	5	5	1	<b>4.54E-03</b>	3	<b>1.12E-03</b>	1.08	3478.1222	-47	8	6	3	9	6	4		<b>2.45E-03</b>	3	-5.1	1.07	
3376.2890	31	4	3	1	5	5	0	<b>1.56E-02</b>	3	<b>3.35E-03</b>	1.10	3478.5877	<b>0</b>	1	3	1	1	3	1	1	<b>1.34E-04</b>	6	-9.8		
3384.7701	18	7	<b>1</b>	6		835		<b>1.74E-03</b>	3	-4.0	1.08	3481.6825	<b>-47</b>	<b>8</b>	<b>2</b>	<b>7</b>	<b>8</b>	<b>4</b>	<b>4</b>	<b>5.60E-04</b>	10	4.49E-04	1.22		
3385.1333	-45	7	2	5	8	4	4	<b>1.70E-03</b>	3	-3.0	1.16	3485.01517	28	7	3	5	7	5	2	<b>3.11E-03</b>	2	<b>1.76E-03</b>	1.07		
3385.791	0	<b>12</b>	5	8	<b>13</b>	5	9	<b>5.83E-05</b>	10	6.63E-05		3486.44436	9	8	5	3	9	5	4	<b>2.00E-02</b>	2	-7.0	1.08		
3386.0034	0	<b>12</b>	4	8	<b>13</b>	4	9	<b>2.90E-04</b>	7	-4.5	1.01	3487.9183	<b>-18</b>	8	5	4	9	5	5	6.50E-03	6	-9.4	1.05		
3397.349	0	11	6	5	12	66		<b>8.81E-05</b>	10	<b>1.07E-04</b>		3488.20005	-5	8	4	4	9	4	5	<b>4.05E-02</b>	2	<b>4.74E-02</b>	1.09		
3398.8781	-7	6	0	6	7	2	5	6.05E-03	2	-0.9	1.09	3488.58395	6	9	2	7	1	0	2	8	<b>1.35E-02</b>	3	0.7	1.10	
3399.2126	<b>-27</b>	5	2	4	6	4	3	<b>1.80E-03</b>	3	<b>9.13E-03</b>	1.01	3489.24217	-6	10	1	9	11	1	10	<b>2.95E-02</b>	3	3.3	1.15		
3399.2420	-33	11	66	12	6	7		3.50E-04	5	<b>9.0</b>	<b>1.29</b>	3489.3206	<b>4</b>	1	0	2	9	1	1	2	0.905E-03	2	-4.6	1.08	
3400.6453	<b>13</b>	11	5	6	12	5	7	<b>2.00E-04</b>	6	<b>2.50E-04</b>	<b>1.01</b>	3489.93733	<b>4</b>	9	3	7	1	0	3	8	<b>3.60E-02</b>	3	-2.2	1.13	
3401.1606	0	14	2	13	15	2	14	<b>7.05E-05</b>	10	8.3	1.20	3490.5664	-52	6	3	4	6	5	1		<b></b>				

Table 8 continued

observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	(o-c)%*	R	observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R									
3523.6800	6	1	1	1	1	1	1	1	0	1.60E-03	4	-3.3	1.17	3632.87032	2	3	2	1	4	2	2	9.03E-01	2	1.9	1.14
3524.7193	-27	12	1	11	12	3	10	3.00E-04	10	3.47E-04	1.02	3633.44920	-23	4	1	3	4	3	2	7.20E-01	5	-3.7	1.08		
3526.7457	-37	12	2	11	12	2	10	1.20E-04	10	1.16E-04	3	3633.57387	11	3	3	1	4	3	2	1.1OE-OO	2	3.1	1.16		
3528.6599	0	6	2	5	6	4	2	3.75E-03	3	2.24E-03	1.05	3633.81777	1	5	1	4	5	3	3	3.40E-02	6	3.8	1.16		
3528.8192	-62	8	3	5	8	5	4	1.19E-03	5	1.58E-03	1.24	3635.41646	-30	4	0	4	5	0	5	3.82E-00	5	-2.1	1.10		
'3530.4758	121	6	6	0	7	6	1	2.61E-02	3	-1.5	1.09	3637.15210	-1	4	1	4	5	1	5	1.1OE-OO	2	1.27E-00	1.13		
3531.84672	-4	8	1	7	9	1	8	1.99E-01	2	1.7	1.13	3637.22520	7	3	1	2	4	1	3	1.36E-00	4	4.5	1.17		
3532.21265	4	8	2	7	9	2	8	6.36E-02	3	-0.9	1.11	3638.47075	-2	6	1	6	6	1	5	4.60E-02	2	-3.9	1.14		
*3533.5265	-118	9	1	9	1	0	1	1	0	2.69E-01	3	7.8	1.21	3642.29830	5	3	2	2	4	2	3	2.60E-00	4	-4.6	1.08
3534.51230	1	7	3	5	8	3	6	1.94E-01	2	2.27E-01	1.11	3646.35022	9	5	0	5	5	2	4	7.45E-02	2	-2.0	1.12		
3536.6492	-37	2	1	2	3	3	1	4.73E-03	5	6.04E-03	1.04	3648.27877	-7	1	1	4	8	1	1	4	7.53E-04	4	6.59E-04	1.04	
3540.4868	41	6	5	2	7	5	3	2.67E-02	4	-2.5	1.10	3650.42795	27	9	3	7	9	3	6	8.11E-03	2	9.90E-03	1.04		
3545.7665	17	1	0	3	7	1	0	5	6	4.72E-04	4	-7.0	1.10	3654.80652	1	3	0	3	4	0	4	1.71E-00	4	1.4	1.14
3546.10270	0	1	0	1	1	0	1	1	9	1.50E-03	2	-6.8	1.10	3654.87375	-2	7	2	6	7	2	5	7.18E-02	2	-9.1	1.16
3546.49954	0	6	4	2	7	4	3	2.07E-01	2	-6.5	1.09	3656.7349	25	3	1	3	4	1	4	4.70E-00	6	-4.6	1.10		
3548.87519	1	6	4	3	7	4	4	7.01E-02	2	-5.2	1.11	3660.7006	0	2	2	0	3	2	1	2.40E-00	5	3.4	1.16		
3551.5360	-53	4	2	3	4	4	0	4.95E-04	5	1.79E-03	1.04	3660.84329	2	4	0	4	4	2	3	3.19E-00	3	1.2	1.15		
3552.3519	-27	2	1	1	3	3	0	2.76E-02	3	-3.1	1.15	3661.7764	5	2	1	1	3	1	2	4.40E-00	10	-1.6	1.11		
3552.60365	-5	7	1	6	8	1	7	1.50E-01	4	1.6	1.13	3662.91958	-2	5	1	5	5	1	4	2.54E-01	4	-8.7	1.14		
3553.4125	2	7	2	6	8	2	7	4.30E-01	5	0.5	1.15	3665.32215	3	2	2	1	3	2	2	7.80E-01	5	0.3	1.13		
3554.34975	6	6	2	4	7	2	5	6.50E-01	4	0.4	1.10	3667.601	-131	5	2	4	4	4	1	1.74E-04	10	8.23E-04	1.12		
3554.445	138	8	0	8	9	0	9	4.22E-01	6	-0.7	1.12	3669.0828	61	1	0	8	2	1	0	8.3	7.44E-04	3	-0.4	0.98	
3554.458	-25	8	1	8	9	1	9	1.41E-01	6	-0.7	1.13	3671.2846	-1	3	0	3	3	2	3	1.03E-01	3	1.2	1.13		
3555.55130	2	5	1	5	5	3	2	1.29E-02	2	1.01E-02	1.10	*3671.66387	-31	9	8	2	9	8	1	3.07E-03	3	12.8	1.11		
3557.91988	9	6	3	4	7	3	5	1.29E-01	4	1.54E-01	1.13	3672.9159	-1	1	0	4	7	1	0	4	6	9.40E-04	4	-4.0	1.22
3561.58115	9	3	0	3	4	2	2	3.57E-02	2	1.0	1.13	3674.0250	-1	8	8	0	8	8	1	9.80E-03	4	10.0	1.08		
3562.7965	59	1	1	2	9	1	1	4	8	2.21E-04	10	2.3	1.16	3674.3475	-2	2	0	2	3	0	3	5.90E-00	3	3.9	1.17
3566.5650	-5	5	5	0	6	5	1	3.30E-02	3	2.2	1.13	3675.8756	20	8	3	6	8	3	5	9.77E-03	6	1.12E-02	1.18		
3566.59813	0	5	5	1	6	5	2	9.70E-02	2	0.1	1.11	3677.1762	11	2	1	2	3	1	3	1.70E-00	5	1.6	1.15		
3567.4010	38	9	0	9	9	2	8	4.08E-03	2	-4.7	1.13	3677.2084	1	2	0	2	2	2	1	1.57E-01	3	1.9	1.12		
3567.49685	10	10	1	9	10	3	8	3.53E-03	5	-4.8	1.11	3678.7629	0	11	7	5	11	7	4	3.75E-04	7	3.00E-04	1.30		
3568.5670	29	9	1	9	9	1	8	1.21E-02	2	-6.2	1.11	3679.60958	2	6	2	5	6	2	4	4.75E-02	4	6.60E-02	1.09		
3574.08315	0	5	4	1	6	4	2	1.13E-01	3	-2.2	1.11	3681.53106	0	1	0	7	4	1	0	7	3	4.35E-04	2	7.8	1.11
3574.20208	3	5	3	2	6	3	3	1.85E-01	4	2.63E-01	1.14	3681.9886	10	5	1	5	4	3	2	2.97E-03	3	-0.3	1.05		
3574.24958	-1	6	2	5	7	2	6	2.55E-01	3	2.83E-01	1.12	3682.474	-68	9	2	8	8	4	5	1.80E-04	10	2.75E-04	0.87		
3574.92363	3	5	4	2	6	4	3	3.40E-01	4	-2.0	1.12	3684.0404	5	9	7	3	9	7	2	4.71E-03	5	7.2	1.10		
3575.1288	22	7	0	7	8	0	8	3.00E-01	3	3.4	1.16	3684.0552	25	9	7	2	9	7	3	1.57E-03	5	7.2	1.10		
3575.1688	-33	7	1	7	8	1	8	9.00E-01	10	3.6	1.17	3684.2936	-2	7	2	6	6	4	3	1.10E-03	10	-5.1	1.10		
3575.7666	-32	5	2	3	5	4	2	3.30E-03	4	4.16E-03	1.04	3685.1263	4	1	1	5	7	1	1	5	6	6.1OE-04	3	6.87E-04	1.04
3577.27775	-45	10	2	8	104	7	1	1.92E-03	4	-1.5	1.12	*3686.3324	40	8	7	1	8	7	2	2.1OE-02	4	8.6	1.12		
3579.07333	5	5	2	3	6	2	4	4.31E-01	5	2.3	1.13	3687.5130	5	1	1	0	2	1	1	1.14E-00	5	-4.2	1.09		
3582.45583	7	5	3	3	6	3	4	6.58E-01	3	8.02E-01	1.09	3687.56465	1	4	1	4	4	1	3	2.13E-01	3	1.72E-01	1.15		
3583.76936	-18	6	2	4	6	4	3	1.37E-02	4	1.52E-02	1.10	3689.95862	-8	6	3	3	7	1	6	1.63E-03	2	9.96E-04	1.17		
3587.1331	-43	9	2	7	9	4	6	1.64E-03	4	2.1	1.15	3692.21540	6	9	4	6	9	4	5	1.07E-02	2	1.20E-02	1.12		
3588.7871	-16	8	0	8	8	2	7	3.20E-02	10	2.7	1.21	3692.3490	-40	1	0	6	5	1	0	6	4	7.95E-04	5	9.2	1.18
3588.6768	-21	7	2	5	7	4	4	4.15E-03	4	4.55E-03	1.05	3693.72457	46	1	0	6	4	1	0	6	5	2.50E-03	2	2.16E-03	1.24
3591.2571	12	8	1	8	8	1	7	1.12E-02	4	6.8	1.26	3695.16333	-4	1	0	1	2	0	2	1.64E-00	5	-5.6	1.07		
3591.2724	65	8	2	6	8	4	5	8.70E-03	8	-6.5	1.05	3695.197	-32	9	6	4	9	6	3	8.01E-03	5	1.3	1.07		
3592.1435	-58	11	3	9	11	3	8	7.1OE-04	10	-8.5	1.09	3695.58875	-4	9	6	3	9	6	4	2.75E-03	2	3.0	1.10		
3593.2338	1	5	1	4	6	1	5	5.90E-01	5	5.3	1.17	3696.0076	-74	1	0	5	6	1	0	5	5	9.46E-04	3	-6.4	1.08
3595.55323	0	6	0	6	7	0	7	1.60E-00	5	-0.3	1.13	3696.66859	-2	7	3	5	7	3	4	8.63E-02	2	1.09E-01	1.14		
3595.66443	2	6	1	6	7	1	7	5.44E-01	5	2.0	1.15	3697.55565	0	8	6	3	8	6	2	9.30E-03	3	5.4	1.12		
3598.25590	-22	3	1	3	3	3	0	9.1OE-03	3	1.22E-02	1.09	3697.64288	-7	8	6	2	8	6	3	2.85E-02	5	7.0	1.14		
3599.79505	2	5	2	4	6	2	5	1.1OE-00	5	1.48E-00	1.16	3697.99642	4	1	1	1	2	1	2	3.70E-00	5	-1.5	1.11		
35	99.88495	4	2	0	2	3	2	1.45E-01	3	0.0	1.12	3699.6204	2	2	7	6	2	7	6	1	8.33E-02	5	6.3	1.12	
3600.7226	-14	4	4	0	5	4	1</td																		

Table 8 continued

observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	K <sub>c</sub>	lower J	K <sub>a</sub>	K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup> R				
3722.80560	-19	4	4	1	4	.4	0	<b>7.30E-01</b>	8	<b>-0.4</b>	<b>1.09</b>	3851.5486	-23	7	2	6	7	0	7	<b>6.85E-02</b>	3	5.6	1.19		
3722.87206	-5	<b>4</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>2.11E-00</b>	3	<b>-4.1</b>	<b>1.05</b>	3851.6257	<b>0</b>	5	2	4	4	2	3	<b>1.75E-00</b>	8	<b>2.83E-00</b>	1.14		
3723.95551	1	2	1	2	2	1	1	<b>6.66E-01</b>	3	<b>4.7</b>	<b>1.17</b>	3855.28425	<b>-3</b>	6	0	6	5	0	5	<b>3.40E-00</b>	6	<b>-4.1</b>	1.11		
3726.09602	27	3	2	1	4	0	4	<b>4.50E-03</b>	3	<b>-7.4</b>	<b>1.08</b>	3855.4625	23	9	3	7	9	1	8	<b>9.30E-03</b>	2	3.1	1.14		
3726.76320	6	8	4	4	8	4	5	<b>3.47E-02</b>	3	<b>4.24E-02</b>	<b>1.09</b>	3857.79725	-5	6	5	2	5	5	1	<b>4.26E-02</b>	2	<b>1.0</b>	1.11		
3727.72330	23	4	3	2	4	3	1	<b>6.58E-01</b>	5	<b>-3.9</b>	<b>1.19</b>	3857.84600	-18	6	5	1	5	5	0	<b>1.30E-01</b>	2	<b>2.7</b>	<b>1.13</b>		
3730.11918	3	3	2	2	3	2	1	<b>2.85E-00</b>	3	<b>5.8</b>	<b>1.17</b>	3858.0352	0	1	1	4	8	1	1	<b>5.30E-04</b>	8	6.3	1.15		
3730.5581	-19	3	3	1	3	3	0	<b>3.80E-00</b>	5	<b>4.41E-00</b>	<b>0.96</b>	3859.21560	9	7	4	4	7	2	5	<b>8.70E-03</b>	3	-1.3	1.11		
3730.68015	-2	4	3	1	4	3	2	<b>1.80E-00</b>	5	<b>2.04E-00</b>	1.12	3859.61081	6	5	1	4	<b>4</b>	<b>1</b>	<b>3</b>	<b>1.15E-00</b>	3	-1.0	1.13		
3731.02138	0	3	3	0	3	3	1	<b>1.44E-00</b>	4	<b>-1.9</b>	<b>1.10</b>	<b>3863.4603</b>	-12	1	0	2	8	1	0	2	9	<b>3.70E-03</b>	3	7.2	1.15
3732.2158	-8	5	3	2	5	3	3	<b>2.00E-01</b>	3	<b>2.85E-01</b>	1.23	3865.61117	7	8	1	7	8	1	8	<b>3.27E-02</b>	5	8.0	1.21		
3734.1720	-45	6	0	6	5	2	3	<b>8.60E-03</b>	8	<b>-1.7</b>	<b>1.20</b>	3865.85166	-2	5	2	3	4	2	2	<b>8.68E-01</b>	5	0.0	1.15		
3734.9615	-10	1	1	1	1	1	0	<b>4.30E-00</b>	8	<b>-0.5</b>	<b>1.13</b>	3866.2247	-16	6	4	3	5	4	2	<b>1.54E-01</b>	4	1.2	1.15		
3735.1630	-21	2	2	0	3	0	3	<b>1.62E-02</b>	5	<b>-5.1</b>	<b>1.07</b>	3866.67922	-1	6	2	5	5	2	4	<b>5.88E-01</b>	2	<b>6.59E-01</b>	1.09		
3735.2947	-21	<b>2</b>	<b>2</b>	<b>1</b>	2	2	0	<b>1.95E-00</b>	5	<b>-0.0</b>	<b>1.13</b>	3867.20958	-20	8	2	7	8	0	8	<b>1.04E-02</b>	3	5.9	1.18		
3738.0240	-8	2	2	0	2	2	1	<b>6.00E-00</b>	5	<b>2.8</b>	<b>1.16</b>	3867.40640	-3	6	4	2	5	4	1	<b>4.45E-01</b>	4	-2.2	1.11		
3741.2577	30	3	0	3	2	2	0	<b>1.41E-02</b>	2	<b>4.6</b>	<b>1.16</b>	3868.48255	2	1	0	3	8	1	0	1	<b>1.35E-03</b>	5	<b>1.08E-03</b>	1.37	
3742.57380	-5	3	2	1	3	2	2	9.30E-01	2	<b>4.8</b>	<b>1.16</b>	3869.5313	<b>8</b>	6	4	3	6	2	4	<b>2.94E-03</b>	3	-5.9	1.07		
3745.55295	0	1	1	0	1	1	1	<b>1.43E-00</b>	4	<b>-0.8</b>	<b>1.12</b>	3870.6026	<b>160</b>	7	6	2	6	6	1	<b>3.65E-02</b>	3	2.6	1.12		
3746.05880	-6	5	0	5	4	2	2	7.40E-03	4	<b>8.23E-03</b>	1.07	3870.82160	-4	7	1	7	6	1	6	<b>2.15E-00</b>	4	-4.6	1.12		
3746.27041	1	6	3	3	6	3	4	2.76E-01	2	<b>3.15E-01</b>	1.15	3871.19462	-8	7	0	7	6	0	6	7.1OE-01	4	-5.8	<b>1.10</b>		
3748.66422	5	4	0	4	3	2	1	<b>4.70E-02</b>	2	<b>-1.3</b>	<b>1.13</b>	3876.28352	-2	6	1	5	<b>5</b>	<b>1</b>	<b>4</b>	<b>2.11E-00</b>	5	-4.6	<b>1.09</b>		
3751.92122	2	<b>4</b>	<b>2</b>	<b>2</b>	4	2	3	<b>1.30E-00</b>	2	<b>10.8</b>	<b>1.23</b>	3877.40230	-2	3	2	1	2	0	2	<b>7.70E-02</b>	4	1.8	<b>1.14</b>		
3753.71150	6	5	1	4	4	3	1	<b>7.40E-03</b>	3	<b>-2.0</b>	<b>1.09</b>	3880.50898	-18	7	5	3	6	5	2	<b>1.14E-01</b>	3	1.9	<b>1.14</b>		
3755.67055	-6	2	1	1	2	1	2	<b>1.85E-00</b>	3	<b>-3.1</b>	<b>1.09</b>	3880.75994	-4	7	5	2	6	5	1	<b>3.66E-02</b>	2	-1.7	1.10		
3756.99690	-1	7	3	4	7	3	5	<b>3.86E-02</b>	2	<b>10.3</b>	<b>1.16</b>	3880.79878	67	5	4	2	5	2	3	<b>6.86E-03</b>	5	-7.5	1.06		
3759.3853	-9	7	2	5	6	4	2	<b>1.30E-03</b>	10	<b>-7.7</b>	<b>1.04</b>	3881.1%39	5	1	1	3	9	1	1	<b>1.18E-03</b>	6	<b>1.03E-03</b>	1.24		
3762.0215	<b>0</b>	1	0	4	6	1	0	<b>4</b>	7	<b>2.72E-03</b>	2	<b>0.1</b>	<b>1.17</b>	3882.0236	-23	8	7	1	7	7	0	<b>6.30E-03</b>	2	7.9	1.16
3765.09076	<b>-5</b>	1	0	1	0	0	0	<b>1.14E-00</b>	5	<b>0.7</b>	<b>1.15</b>	3882.1391	-64	9	1	8	9	1	9	<b>4.35E-03</b>	4	7.1	1.19		
3766.1429	<b>-5</b>	5	2	3	5	2	4	<b>1.75E-01</b>	<b>4</b>	<b>9.6</b>	<b>1.18</b>	3882.85308	-4	9	2	8	9	0	9	<b>1.23E-02</b>	2	1.9	1.14		
3767.0600	-30	8	1	7	7	3	4	<b>3.30E-03</b>	3	<b>3.90E-03</b>	1.07	3884.87580	2	7	2	6	6	2	5	<b>1.13E-00</b>	2	-4.4	1.11		
3768.91520	-2	6	1	5	5	3	2	<b>2.30E-02</b>	2	<b>1.2</b>	<b>1.16</b>	3885.92422	3	6	3	3	5	3	2	<b>6.60E-01</b>	5	<b>1.03E-00</b>	1.14		
3781.99551	<b>1</b>	2	1	2	1	1	1	<b>1.44E-00</b>	5	<b>4.1</b>	<b>1.20</b>	3886.7649	-42	8	1	8	7	1	7	4.1OE-01	3	-4.2	1.13		
3782.2081	-5	8	2	6	7	4	3	3.22E-03	4	<b>-6.9</b>	<b>1.06</b>	3886.92368	7	8	0	8	7	0	7	<b>1.21E-00</b>	3	-5.8	1.11		
3784.35170	0	6	2	4	6	2	5	<b>2.05E-01</b>	3	<b>6.5</b>	<b>1.14</b>	3888.6354	4	7	4	4	6	4	3	<b>2.89E-01</b>	4	-5.5	1.11		
3786.9292	-9	2	0	2	1	0	1	<b>5.70E-00</b>	6	<b>-0.8</b>	<b>1.14</b>	3889.64385	-12	<b>6</b>	<b>2</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>3</b>	<b>1.61E-00</b>	2	-3.7	1.10		
3788.91255	6	4	1	3	<b>4</b>	<b>1</b>	<b>4</b>	<b>5.40E-01</b>	<b>4</b>	<b>4.6</b>	<b>1.16</b>	3890.83535	-22	7	3	5	6	3	4	<b>6.15E-01</b>	4	-4.2	1.19		
3792.63584	1	2	1	1	1	1	0	3.90E-00	4	<b>-1.2</b>	<b>1.13</b>	3890.91846	6	7	1	6	6	1	5	<b>4.33E-01</b>	3	3.8	1.19		
3793.53422	0	9	3	6	9	3	7	3.46E-03	2	<b>11.2</b>	<b>1.13</b>	3890.95783	2	7	4	3	6	4	2	<b>1.00E-01</b>	4	-0.3	1.17		
3795.1736	<b>-12</b>	9	2	7	8	4	4	<b>5.12E-04</b>	8	<b>5.84E-04</b>	1.04	3892.84951	<b>1</b>	8	6	3	7	6	2	7.63E-03	3	8.9	1.21		
3800.15056	-3	2	2	1	2	0	2	<b>4.68E-02</b>	2	<b>6.0</b>	<b>1.14</b>	3892.8%	65	-40	8	6	2	7	6	<b>2.16E-02</b>	3	2.7	1.14		
3804.58170	-6	3	2	2	3	0	3	<b>2.85E-01</b>	3	<b>5.6</b>	<b>1.15</b>	3901.5246	30	8	2	7	7	2	6	<b>2.14E-01</b>	4	2.8	1.19		
3804.97510	2	7	2	5	7	2	6	<b>2.73E-02</b>	2	<b>8.5</b>	<b>1.15</b>	3902.3307	-35	9	1	9	8	1	8	<b>6.50E-01</b>	3	-0.8	1.18		
3806.11302	-6	3	0	3	2	0	2	2.1OE-05	5	<b>-3.7</b>	<b>1.11</b>	3902.3974	-39	9	0	9	8	0	8	<b>2.17E-01</b>	3	-0.7	<b>1.17</b>		
3807.44264	1	3	2	2	2	2	1	<b>2.70E-00</b>	5	<b>-3.9</b>	<b>1.19</b>	3902.94652	-3	8	5	4	7	5	3	<b>2.19E-02</b>	3	-1.2	1.12		
3809.19816	-6	<b>5</b>	<b>1</b>	<b>4</b>	5	1	5	9.80E-02	3	<b>7.1</b>	<b>1.18</b>	3903.7450	246	9	7	3	8	7	2	<b>4.14E-03</b>	3	1.0	1.11		
3812.54668	4	3	2	1	2	2	0	<b>8.65E-01</b>	<b>4</b>	<b>-2.7</b>	<b>1.14</b>	3903.8533	8	8	5	3	7	5	2	<b>6.60E-02</b>	3	-0.5	1.14		
3812.9756	<b>46</b>	4	2	3	4	0	4	<b>1.04E-01</b>	3	<b>7.8</b>	<b>1.23</b>	3904.9155	-1	8	1	7	7	1	6	<b>6.40E-01</b>	3	-0.2	1.15		
3815.01855	2	1	0	3	7	1	0	3	8	<b>2.87E-03</b>	<b>10.4</b>	3906.6074	-80	8	5	4	8	3	5	<b>2.47E-04</b>	10	1.3	<b>1.19</b>		
3817.23979	10	3	1	2	2	1	1	<b>1.76E-00</b>	2	<b>1.9</b>	<b>1.17</b>	3906.8956	10	4	4	0	4	2	3	<b>2.58E-03</b>	3	-9.0	1.12		
3820.79970	-9	<b>4</b>	<b>1&lt;/</b>																						

Table 8 continued

observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength %	(o-c)% <sup>a</sup> R	observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength %	(o-c)% <sup>a</sup> R												
3722.80560	-19	<b>4</b>	<b>4</b>	<b>1</b>	4	4	0	<b>7.30E-01</b>	8	-0.4	1.09	3851.5486	-23	7	2	6	7	0	7	<b>6.85E-02</b>	3	5.6	1.19		
3722.87206	-5	4	4	0	'	4	4	1	<b>2.11 E-00</b>	3	-4.1	1.05	3851.6257	<b>0</b>	5	2	4	4	2	3	<b>1.75E-00</b>	8	<b>2.83E-00</b>	1.14	
3723.95551	1	2	1	2	2	1	1	<b>6.66E-01</b>	3	<b>4.7</b>	1.17	3855.28425	<b>-3</b>	6	0	6	5	0	5	<b>3.40E-00</b>	6	-4.1	1.11		
3726.09602	27	3	2	1	4	0	4	4.50E-03	3	<b>-7.4</b>	1.08	3855.4625	23	9	3	7	9	1	8	<b>9.30E-03</b>	2	3.1	1.14		
3726.76320	6	8	4	4	8	4	5	<b>3.47E-02</b>	3	<b>4.24E-02</b>	1.09	3857.79725	-5	6	5	2	5	5	1	<b>4.26E-02</b>	2	<b>1.0</b>	<b>1.11</b>		
3727.72330	23	4	3	2	3	4	3	<b>1</b>	<b>6.58E-01</b>	5	-3.9	1.19	3857.84600	-18	6	5	1	5	5	0	<b>1.30E-01</b>	2	<b>2.7</b>	<b>1.13</b>	
3730.11918	3	3	2	2	3	2	1	2.85E-00	3	5.8	1.17	3858.0352	0	1	1	4	8	1	1	2	9	5.30E-04	8	6.3	1.15
3730.5581	-19	3	3	1	3	3	0	<b>3.80E-00</b>	5	<b>4.41E-00</b>	0.96	3859.21560	9	7	4	4	7	2	5	<b>8.70E-03</b>	3	-1.3	1.11		
3730.68015	-2	4	3	1	4	3	2	<b>1.80E-00</b>	5	2.04E-00	1.12	3859.61081	6	5	1	4	<b>4</b>	<b>1</b>	<b>3</b>	<b>1.15E-00</b>	3	-1.0	1.13		
3731.02138	0	3	3	0	3	3	1	<b>1.44E-00</b>	4	-1.9	1.10	3863.4603	-12	1	0	2	8	1	0	2	9	<b>3.70E-03</b>	3	7.2	1.15
3732.2158	-8	5	3	2	5	3	3	<b>2.00E-01</b>	3	<b>2.85E-01</b>	1.23	3865.61117	7	8	1	7	8	1	8	3.27E-02	5	8.0	1.21		
3734.1720	-45	6	0	6	5	2	3	<b>8.60E-03</b>	8	-1.7	1.20	3865.85166	-2	5	2	3	4	2	2	<b>8.68E-01</b>	5	0.0	1.15		
3734.9615	-10	1	1	1	1	1	0	<b>4.30E-00</b>	8	-0.5	1.13	3866.2247	-16	6	4	3	5	4	2	<b>1.54E-01</b>	4	1.2	1.15		
3735.1630	-21	2	2	0	3	0	3	<b>1.62E-02</b>	5	-5.1	1.07	3866.67922	-1	6	2	5	5	2	4	<b>5.88E-01</b>	2	<b>6.59E-01</b>	1.09		
3735.2947	-21	2	2	1	2	2	0	<b>1.95E-00</b>	5	-0.0	1.13	3867.20958	-20	8	2	7	8	0	8	1.04E-02	3	5.9	1.18		
3738.0240	-8	2	2	0	2	2	1	<b>6.00E-00</b>	5	2.8	1.16	3867.40640	-3	6	4	2	5	4	1	<b>4.45E-01</b>	4	-2.2	1.11		
3741.2577	30	3	0	3	2	2	0	<b>1.41E-02</b>	2	4.6	1.16	3868.48255	2	1	0	3	8	1	0	1	9	<b>1.35E-03</b>	5	<b>1.08E-03</b>	1.37
3742.57380	-5	3	2	1	3	2	2	<b>9.30E-01</b>	2	<b>4.8</b>	<b>1.16</b>	3869.5313	<b>8</b>	6	4	3	6	2	4	2.94E-03	3	-5.9	1.07		
3745.55295	0	1	1	0	1	1	1	<b>1.43E-00</b>	4	<b>-0.8</b>	<b>1.12</b>	3870.6026	<b>160</b>	7	6	2	6	6	1	<b>3.65E-02</b>	3	2.6	1.12		
3746.05880	-6	5	0	5	4	2	2	<b>7.40E-03</b>	4	<b>8.23E-03</b>	1.07	3870.82160	-4	7	1	7	6	1	6	<b>2.15E-00</b>	4	-4.6	1.12		
3746.27041	<b>1</b>	6	3	3	6	3	4	<b>2.76E-01</b>	2	<b>3.15E-01</b>	1.15	3871.19462	-8	7	0	7	6	0	6	7.1 OE-01	4	-5.8	1.10		
3748.66422	5	4	0	4	3	2	1	<b>4.70E-02</b>	2	-1.3	1.13	3876.28352	-2	6	1	5	<b>5</b>	<b>1</b>	<b>4</b>	<b>2.11 E-00</b>	5	-4.6	1.09		
3751.92122	2	4	2	2	4	2	3	<b>1.30E-00</b>	2	10.8	1.23	3877.40230	-2	3	2	1	2	0	2	7.70E-02	4	1.8	1.14		
3753.71150	6	<b>5</b>	<b>1</b>	<b>4</b>	4	3	1	<b>7.40E-03</b>	3	-2.0	1.09	3880.5089	-18	7	5	3	6	5	2	<b>1.14E-01</b>	3	1.9	1.14		
3755.67055	-6	2	1	1	2	1	2	<b>1.85E-00</b>	3	-3.1	1.09	<b>3880.75994</b>	-4	7	5	2	6	5	1	<b>3.66E-02</b>	2	-1.7	1.10		
3756.99690	-1	7	3	4	7	3	5	<b>3.86E-02</b>	2	10.3	1.16	3880.7987	67	5	4	2	5	2	3	<b>6.86E-03</b>	5	-7.5	1.06		
3759.3853	-9	7	2	5	6	4	2	1.30E-03	10	-7.7	1.04	3881.639%	<b>5</b>	1	1	3	9	1	1	1	0	<b>1.18E-03</b>	6	<b>1.03E-03</b>	1.24
3762.0215	1	0	4	6	1	0	4	<b>7.72E-03</b>	2	0.1	1.17	3882.0236	<b>-23</b>	8	7	1	7	7	0	<b>6.30E-03</b>	2	7.9	1.16		
3765.09076	-;	1	0	1	0	0	0	<b>1.14E-00</b>	5	0.7	1.15	3882.1391	-64	9	1	8	9	1	9	<b>4.35E-03</b>	4	7.1	1.19		
3766.1429	-5	5	2	3	5	2	4	<b>1.75E-01</b>	4	9.6	1.18	3882.85308	-4	9	2	8	9	0	9	1.23E-02	2	1.9	1.14		
3767.0600	-30	8	1	7	7	3	4	3.30E-03	3	<b>3.90E-03</b>	1.07	3884.8780	2	7	2	6	6	2	5	<b>1.13E-00</b>	2	-4.4	1.11		
3768.91520	-2	6	1	5	5	3	2	2.30E-02	2	1.2	1.16	3885.92422	3	6	3	3	5	3	2	<b>6.60E-01</b>	5	<b>1.03E-00</b>	1.14		
3781.99551	1	2	1	2	1	1	1	<b>1.44E-00</b>	5	<b>4.1</b>	1.20	3886.7649	-42	8	1	8	7	1	7	4.1 OE-01	3	-4.2	1.13		
3782.2081	-5	8	2	6	7	4	3	3.22E-03	4	-6.9	1.06	3886.92368	7	8	0	8	7	0	7	<b>1.21E-00</b>	3	-5.8	1.11		
3784.35170	0	6	2	4	6	2	5	<b>2.05E-01</b>	3	6.5	<b>1.14</b>	3888.6354	4	7	4	4	6	4	3	2.89E-01	4	-5.5	1.11		
3786.9292	-9	2	0	2	1	0	1	<b>5.70E-00</b>	6	-0.8	<b>1.14</b>	3889.64385	-12	6	2	4	5	2	3	<b>1.61E-00</b>	2	-3.7	1.10		
3788.91255	6	<b>4</b>	<b>1</b>	<b>3</b>	4	1	4	<b>5.40E-01</b>	4	4.6	1.16	3890.8353	-22	7	3	5	6	3	4	<b>6.15E-01</b>	4	-4.2	1.19		
3792.63584	1	2	1	1	1	1	0	<b>3.90E-00</b>	4	-1.2	1.13	3890.91846	6	7	1	6	6	1	5	4.33E-01	3	<b>3.8</b>	1.19		
3793.53422	0	9	3	6	9	3	7	<b>3.46E-03</b>	2	11.2	1.13	3892.05783	2	7	4	3	6	4	2	<b>1.00E-01</b>	4	<b>-0.3</b>	1.17		
3795.1736	-12	9	2	7	8	4	4	<b>5.12E-04</b>	8	<b>5.84E-04</b>	1.04	3892.84951	1	8	6	3	7	6	2	<b>7.63E-03</b>	3	8.9	1.21		
3800.15056	-3	2	2	1	2	0	2	4.68E-02	2	6.0	1.14	3892.89565	-40	8	6	2	7	6	1	<b>2.16E-02</b>	3	2.7	1.14		
3804.58170	-6	3	2	2	3	0	3	<b>2.85E-01</b>	3	5.6	1.15	3901.5246	30	8	2	7	7	2	6	<b>2.14E-01</b>	4	2.8	1.19		
3804.97510	2	7	2	5	7	2	6	<b>2.73E-02</b>	2	8.5	1.15	3902.3307	-35	9	1	9	8	1	8	<b>6.50E-01</b>	3	-0.8	1.18		
3806.11302	-6	3	0	3	2	0	2	2.1 OE-00	5	-3.7	1.11	3902.3974	-39	9	0	9	8	0	8	<b>2.17E-01</b>	3	-0.7	1.17		
3807.44264	<b>1</b>	3	2	2	2	2	1	<b>2.70E-00</b>	5	-3.9	1.19	3902.94652	-3	8	5	4	7	5	3	<b>2.19E-02</b>	3	-1.2	1.12		
3809.19816	-6	<b>5</b>	<b>1</b>	<b>4</b>	5	1	5	<b>9.80E-02</b>	3	7.1	1.18	3903.7450	246	9	7	3	8	7	2	<b>4.14E-03</b>	3	1.0	1.11		
3812.54668	<b>4</b>	3	2	1	2	2	0	<b>8.65E-01</b>	4	-2.7	1.14	3903.8533	8	8	5	3	7	5	2	6.60E-02	3	-0.5	1.14		
3812.9756	<b>46</b>	4	2	3	4	0	4	<b>1.04E-01</b>	3	7.8	1.23	3904.9155	-1	8	1	7	7	1	6	6.40E-01	3	-0.2	1.15		
3815.01855	2	1	0	3	7	1	0	<b>2.87E-03</b>	3	10.4	1.13	<b>3906.6074</b>	-80	8	5	4	8	3	5	<b>2.47E-04</b>	10	1.3	1.19		
3817.23979	10	3	1	2	2	1	1	<b>1.76E-00</b>	2	1.9	1.17	3906.8956	10	4	4	0	4	2	3	<b>2.58E-03</b>	3	-9.0	1.12		
3820.79970	-9	4	1	4	3	1	3	<b>1.50E-00</b>	6	<b>1.95E-00</b>	1.09	3907.5959	-51	5	3	2	5	1	5	9.00E-04	3	<b>1.70E-03</b>	1.10		
3823.12678	0	4	0	4	3	0	3	<b>5.80E-00</b>	5	-5.0	1.09	3910.23819	-7	8	4	5	7	4	4	<b>5.28E-02</b>	2	-2.5	1.16		
3825.99380	-3	8	2	6	8	2	7	3.1 OE-02	2	8.1	1.15	3910.33512	7	7	2	5	6	2	4	<b>2.95E-01</b>	2	-0.7	1.13		
<b>3826.19912</b>	-1	5	2	4	5	0	5	<b>1.61E-01</b>	2	<b>2.13E-01</b>	1.18	3910.4422	-9	8											

Table 8 continued

observed position	o-c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	(o-c)% <sup>a</sup>	R	observed position	o - c	upper J	K <sub>a</sub>	lower K <sub>c</sub>	observed strength	%s	( o - c ) % <sup>a</sup> R												
3932.424	359	11	1	11	10	1	10	1.29E-01	4	2.0	.23	4003.1268	0	1	3	5	9	1	2	5	8	3.30E-04	5	-1.7	1.17			
3932.434	8	9	11	0	11	10	0	10	4.33E-02	4	2.7	.24	4004.0104	57	5	3	3	4	1	4	4	4	3.26E-02	5	-5.3	1.16		
3932.8666	1	6	5	2	6	3	3	2.75E-04	10	-8.0	.21	4010.6310	0	1	3	3	1	0	1	2	3	9	3.27E-04	4	8.3	1.27		
3933.02165	-8	1	0	1	9	9	1	8	1.26E-01	3	0.8	.18	4010.75582	2	6	2	4	5	0	5	4	5	4.55E-02	3	-2.6	1.16		
3933.87633	-40	3	3	1	2	1	2	2.55E-02	2	3.2	.14	4011.8114	19	5	4	1	4	2	2	2	8.91	E-03	3	3.2	1.11			
3935.63893	0	8	3	5	7	3	4	2.88E-01	2	-0.1	.15	4019.4964	0	1	2	4	8	1	1	4	7	2.16E-03	5	-0.8	1.09			
3936.4733	3	1	0	6	5	9	6	4	1.63E-03	2	3.6	.19	4027.04083	4	6	4	2	5	2	3	3.33E-02	4	9.3	1.15				
3937.08881	-7	4	3	1	3	1	2	9.15E-02	2	0.4	.15	4027.3364	-3	5	4	2	4	2	3	2.23E-02	3	3.9	1.14					
3937.1229	-15	1	0	6	4	9	6	3	4.80E-03	6	1.9	.17	4028.57850	0	7	3	4	6	1	5	1.42E-02	3	1.74E-02	1.15				
3937.6475	0	7	4	3	7	2	6	3.45E-04	5	4.85E-04	.11	4043.00741	-6	7	4	3	6	2	4	1.00E-02	2	8.5	1.12					
3940.9453	-35	5	5	1	5	3	2	4.43E-04	3	5.55E-04	1	0.9	4045.46574	-7	6	3	4	5	1	5	7.44E-03	3	-5.7	1.15				
3941.39055	5	9	2	7	8	2	6	5.72E-02	3	2.5	.16	4056.60095	6	6	4	3	5	2	4	6.88E-03	3	0.3	1.10					
3943.01790	21	9	4	5	8	4	4	1.74E-02	2	2.30E-02	1	1.4	4062.94675	24	8	4	4	7	2	5	2.00E-02	4	3.0	1.11				
3945.03160	-2	1	0	3	8	9	3	1.93E-02	2	0.1	.15	4065.9772	4	5	5	0	4	3	1	1.78E-03	5	0.6	1.11					
3946.1897	-18	1	0	5	6	9	5	5	3.90E-03	3	-6.8	.10	4066.72665	-3	7	2	5	6	0	6	6.03E-03	3	-5.4	1.13				
3946.2791	0	1	1	7	4	1	0	7	3	2.00E-04	10	10.0	.125	4067.3830	13	5	5	1	4	3	2	5.00E-03	4	-5.0	1.05			
3946.3069	10	6	3	3	6	1	6	1.16E-03	5	1.58E-03	1	1.6	4069.181	199	4	4	0	3	0	3	2.04E-04	10	-3.6	1.12				
3946.61746	6	1	2	1	2	0	1	0	2	9	4.83E-02	3	1.8	4073.4941	-4	8	3	5	7	1	6	1.83E-02	3	-9.5	1.17			
*3946.9587	-76	1	2	0	1	2	1	1	0	1	1	6.35E-02	4	-0.6	.12	4085.80050	6	6	5	1	5	3	2	7.71E-03	2	2.1	1.09	
3947.02486	-3	1	1	1	1	0	1	0	1	9	1.66E-02	3	4.7	.123	4089.2178	28	7	4	4	6	2	5	1.55E-02	3	6.3	1.16		
3950.0900	-13	1	0	4	7	9	4	6	8.88E-03	4	-5.7	.13	4089.235	53	9	4	5	8	2	6	2.92E-03	4	-4.6	1.04				
3952.04196	3	1	0	5	5	9	5	4	1.17E-02	3	-5.0	1.14	4102.2647	19	7	5	2	6	3	3	2.46E-03	4	3.7	1.07				
3953.52820	9	1	0	2	8	9	2	7	6.28E-02	3	0.9	.15	4105.0371	44	5	4	1	4	0	4	2.00E-04	10	2.0	1.19				
3957.39147	7	9	3	6	8	3	5	4.07E-02	3	4.7	.17	4115.20270	-11	7	5	3	6	3	4	6.70E-03	3	1.0	1.06					
3957.6730	35	11	66	10	6	5	1	1.60E-03	3	-4.4	.12	4115.50686	-8	8	5	3	7	3	4	5.58E-03	5	4.3	1.04					
3958.0089	-4	5	3	2	4	1	3	3.44E-02	2	4.00E-02	1	1.5	4124.13025	7	8	2	6	7	0	7	7.59E-03	4	-3.0	1.16				
3959.07713	0	5	2	3	4	0	4	3	.5	6	E	-0	2	3	-0.7	.17	4125.2246	-51	9	3	6	8	1	7	2.03E-03	3	-6.0	1.13
3959.4527	0	1	1	6	5	1	0	6	4	5.35E-04	7	-3.7	.13	4125.5366	27	8	4	5	7	2	6	2.78E-03	5	1.8	1.10			
3960.2183	-7	1	1	3	9	1	0	3	8	2.07E-02	2	1.4	.16	4127.3618	-6	9	5	4	8	3	5	1.23E-03	3	10.4	1.08			
3960.6366	37	12	2	11	11	2	10	5	5.61E-03	5	2.5	.121	4129.8564	-21	6	6	0	5	4	1	1.40E-03	4	-8.9	0.99				
3960.83055	0	1	2	1	1	1	1	1	1	1	1	1.68E-02	2	2.2	.120	4130.1043	0	6	6	1	5	4	2	4.83E-04	3	-5.7	1.03	
*3961.1492	76	1	3	1	1	3	1	2	1	2	1	2.15E-02	3	-2.1	.121	4138.2715	9	1	0	4	6	9	2	7	1.25E-03	4	3.27E-03	1.18
3961.4846	-62	8	4	1	1	8	2	7	1.64E-04	10	4.18E-04	0.82	4139.2175	-2	8	3	6	7	1	7	2.14E-03	4	-2.8	1.11				
3965.2537	-2	1	1	2	9	1	0	2	8	7.29E-03	2	3.0	.117	4140.85644	-3	1	0	5	5	9	3	6	2.03E-03	2	1.77E-03	1.09		
3966.44281	-9	11	5	7	10	5	6	4.00E-03	3	-6.8	.11	4141.1749	-19	8	5	4	7	3	5	1.56E-03	4	2.9	1.06					
3966.8577	17	4	3	2	3	1	3	1.16E-02	4	-7.8	.109	4148.1531	48	6	4	2	5	0	5	5.55E-04	7	6.64E-04	0.99					
3967.2090	0	1	2	7	5	1	1	7	4	1.85E-04	10	9.7	1.23	4151.61522	-37	7	6	1	6	4	2	6.48E-04	6	0.8	1.05			
3968.0250	-7	11	4	8	10	4	7	9.36E-03	4	-2.0	1.15	4152.7617	-43	7	6	2	6	4	3	1.82E-03	2	-5.2	0.99					
3974.2727	0	1	3	2	1	2	2	1	1	5.13E-03	4	-0.5	.18	4159.2868	O	1	1	5	6	1	0	3	2.56E-04	4	3.8	0.97		
3975.0632	0	1	4	1	1	4	1	3	1	1.65E-03	3	-4.0	.121	4165.5005	4	9	4	6	8	2	7	4.01E-03	3	4.6	1.12			
3975.1069	-3	1	4	0	1	4	1	3	0.13	1.59E-03	3	4.5	.132	4169.5914	-9	9	5	5	8	3	6	2.54E-03	3	1.6	1.03			
3975.50890	-2	1	0	3	7	9	3	6	4.22E-02	3	4.2	.116	4171.37136	18	8	6	2	7	4	3	1.61E-03	4	1.5	1.03				
3977.16444	6	12	2	10	11	2	9	6.78E-03	3	2.3	.1171	4179.4937	70	1	1	4	7	1	0	2	8	2.04E-04	10	3.07E-04	1.09			
3977.4542	-106	1	1	5	6	1	0	5	5	1.24E-03	3	-11.3	.113	4180.5437	19	1	0	3	7	9	1	8	2.00E-03	6	-5.3	1.17		
3978.2292	0	1	2	6	7	1	1	6	6	1.58E-04	10	-7.0	.110	4180.6998	-73	9	2	7	8	0	8	1.07E-03	5	1.3	1.21			
3981.2715	-30	1	0	4	6	9	4	5	1.80E-02	3	2.56E-02	1.15	4184.8798	52	1	2	5	7	1	1	3	2.60E-04	4	9.5	1.01			
3982.3694	0	1	2	6	6	1	1	6	5	4.33E-04	3	5.04E-04	1.02	4188.0455	-47	9	6	3	8	4	4	3.69E-04	7	8.7	1.06			
3984.4495	-43	1	2	4	9	1	4	8	9.60E-03	5	2.6	.116	4189.22658	-3	9	3	7	8	1	8	3.01E-03	3	2.7	1.18				
3985.4650	0	1	2	5	8	1	1	5	7	4.20E-04	4	-1.5	.119	4197.6168	-23	9	6	4	8	4	5	1.00E-03	2	1.1	0.99			
3987.55880	0	1	4	2	1	3	1	3	2	1.50E-04	5	1.9	1.22	4200.97985	13	1	0	6	4	9	4	5	5.88E-04	4	9.4	1.04		
3987.6362	0	1	4	1	1	3	1	3	1	1.44E-03	4	-2.2	1.17	4208.6608	84	1	0	4	7	9	2	8	5.62E-04	2	8.6	1.16		
3987.7851	0	1	3	3	1	1	2	3	1	1.87E-03	5	-4.3	1.14	4209.8070	0	8	7	1	7	5	2	3.58E-04	4	4.06E-04	0.88			
*3988.4230	-75	1	5	1	1	5	1	4	1.20E-03	3	2.1	.130	4210.8193	-4	1	1	6	5	1	0	4	6	1.10E-04	10	8.01E-05			
3989.26573	0	13	2	11	12	2	10	6	6.50E-04	3	3.2	.119	4220.															